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STUDY OF LAND USE FOR RECREATION AND FISH AND WILDLIFE ENHANCEM--ETC(U)
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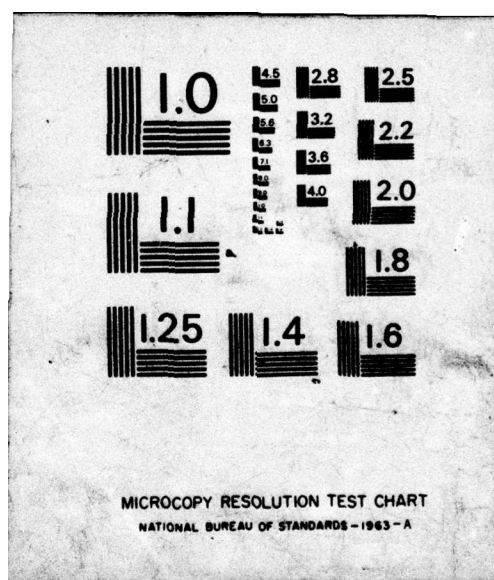
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Appendix D • Volume II

**STUDY OF LAND USE FOR RECREATION AND
FISH AND WILDLIFE ENHANCEMENT**

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**Case Studies
D-6-1 to D-13-1**

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By
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Wilmington, North Carolina

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409-387

New Hampshire

A. Location

B. Authorization and Purposes

The statute authorized a comprehensive program for flood control in the Merrimack River Basin as recommended by the Chief of Engineers following surveys authorized by the Flood Control Act of 1936, and

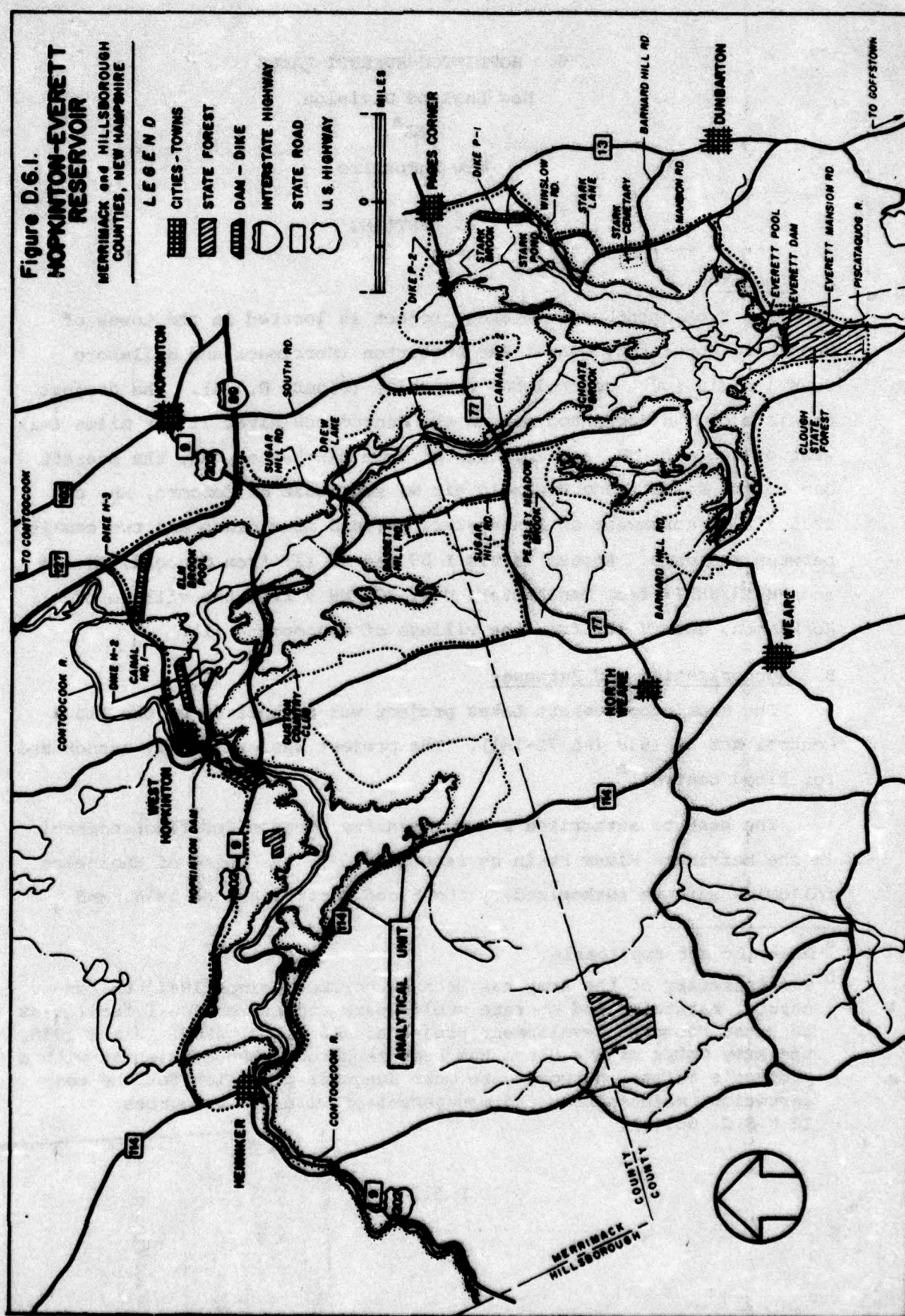
^a District not applicable.

D.6.1

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A

Figure D.6.1.
HOPKINTON-EVERETT
RESERVOIR
MERRIMACK and HILLSBOROUGH
COUNTIES, NEW HAMPSHIRE



provided for the inclusion of other flood control works which the Chief of Engineers might find to be justified. The Hopkinton-Everett Lakes project was twice removed from the Merrimack flood control program while alternatives proposed by the Federal Power Commission (FPC) were studied. The Secretary of the Army notified the Congress that the Chief of Engineers had reinstated the Hopkinton-Everett Lakes project in the comprehensive flood control program in December, 1955. The State of NH concurred on 18 March 1957.

C. Features

The Contoocook River has a length of 50 mi above the Hopkinton Dam, and the drainage area has an average length of 35 mi and a width of 12 mi. The upper basin is surrounded by ridges rising from 1,200 to 1,500 feet mean sea level (ft msl) with isolated peaks extending to 2,000 ft msl. There are a number of natural lakes and ponds, partially controlled by dams, on the north branch of the Contoocook and its tributaries. The drainage basin of the Piscataquog River above the Everett Dam is approximately 15 mi long and 4 mi wide (2).

The topography of south central NH consists of steep-sided, wooded hills and broad, open valleys. The reservoir site is characterized by low, flat, relatively wide areas in the pre-glacial Contoocook and Piscataquog Valleys which have generally been deeply filled by outwash deposits and till. Till and till-covered bedrock hills which rise above the lowlands form the perimeter of the Hopkinton-Everett storage area (1).

Hopkinton-Everett is a dry reservoir. The only permanent water bodies within the project area are pools maintained for recreational and fish and wildlife enhancement purposes. It is estimated that the storage area may be completely filled only once in about 35 years, although partial filling occurs more frequently at unpredictable times.

The full pool in the Hopkinton portion of the project will be emptied in 10 days and the Everett portion in 24 days. Lesser floods will require shorter emptying periods (1). Three permanent pools that provide opportunities for boating, fishing, and swimming are: Everett Pool at the southern end of the reservoir at Everett Dam; Elm Brook Pool at the northern end of the reservoir on Elm Brook; and Drew Lake-Canal No. 2 located halfway between the Elm Brook and Everett Pools (3). The elevations and size of the several permanent pools and other resource statistics are shown in Table 1.6.1.

Table D.6.1. Resource Statistics, Hopkinton-Everett Lakes.

Date of Authorization	June, 1938 ^a December, 1955 ^b
Rights in Land Acquired Between	1958 - 1962
Date of Impoundment	June, 1963 ^c
Date of Full Operation	July, 1963 ^c
Lake Size When Water Level is at:	
Spillway Elevation (416 ft msl)	6,600 acres ^d
Normal Pool Elevation	650 acres ^e
400 ft msl (Drew Lake)	100 acres
383 ft msl (Elm Brook)	300 acres
380 ft msl (Hopkinton)	120 acres
340 ft msl (Everett)	130 acres
Normal Minimum Pool Elevation	NA ^f
Minimum Design Elevation	NA
Shoreline at Normal Pool	40 miles ^c
Held in Fee Simple by Corps	40 miles ^c
Water Fluctuation - Summer Recreation Season	1 to 2 ft
Land Area Managed by Corps	
Total Land in Project	10,018 ^c (10,165) ^e acres
Fee Title in U.S. 7,992 ^c (8,139) ^d acres	
Easements	2,026 acres
Project Operation Lands	602 ^c (303) ^e acres
Manageable Resource Lands	6,740 ^g (c) 7,186 ^g ^e acres

^aGeneral comprehensive plan for flood control approved in 1938.

^bA revised definite project report was approved in 1941, withdrawn in 1942, and reinstated by the Chief of Engineers in 1955.

^cRRMS. 1973.

^dNew England Division. 1965. Hopkinton-Everett Reservoir. Design Memorandum No. X (master plan for reservoir development), Waltham, Massachusetts.

^e New England Division. 1958. Hopkinton-Everett Reservoir Design Memorandum No. II. Boston, Massachusetts.

^f Not applicable.

^g Fee Land - (Normally Inundated Area + Project Operations Land).

II. LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

A. Analytical Unit

There is a geographic area that encompasses the majority of factors which influence the quality of the public lands in the Hopkinton-Everett Lakes project. The area is made up of broad bands on either side of the Contoocook and Piscataquog Rivers upstream from the Hopkinton and Everett Dams and high lands between the rivers where brooks and streams rise that drain into the permanent pools. The configuration of the analytical unit is shown in Figure D.6.1.

Data quantifying population, rates of growth, and ownership within this analytical unit are not readily available. Population growth in the jurisdictions, as shown in Table D.6.2, is indicative of a slow growth trend that is now accelerating, but still relatively small in actual increases of people.

Agriculture in the analytical unit is fairly typical of that occurring in much of southern NH. The commercial farms are mainly dairy, poultry, or combined dairy-poultry enterprises. The most numerous rural establishments are rural residences with a small amount of farm production for family use. Investment on the areas suitable for farming is yielding lower returns than before so more land is being left fallow (4, 5).

B. Ownership

1. Corps

Acquisition by the Corps conformed to the criteria set forth in ER 405-1-1 dated 12 October 1953. The guide taking line was established at elevation 420 ft msl, 4 ft above the spillway elevation, to provide construction, borrow, and reservoir areas. It was estimated that 8,800 acres of land would be required: 6,150 acres were to be acquired

Table D.6.2. Population of Towns Affected by Hopkinton-Everett Lakes Project.

Town	Population			Total Area ^c (Acres)	Taken ^c in Fee ^c	Net	Density/ Acre 1974
	1950	1960 ^a	1970 ^a				
Henniker	--	1,636	2,348	2,151	1,939	26,363	.08
Hopkinton	--	2,225	3,007	3,365	2,693	25,723	.13
Weare	--	1,420	1,851	2,137	1,995	36,597	.06
Dunbarton	--	<u>632</u>	<u>825</u>	<u>920</u>	1,462	18,953	.05
Total	5,365	5,913	8,031	8,573			

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^a U.S. Bureau of the Census. 1971. U. S. Census of Population, 1970; number of inhabitants, New Hampshire. Table 10. Washington, D. C.

^b New Hampshire Office of Comprehensive Planning. 1974. Resident population figures. Concord, New Hampshire (Mimeo).

^c New Hampshire Planning and Development Commission. 1955. Social and economic impacts (of) proposed Hopkinton-Everett reservoir. Concord, New Hampshire.

in fee and the remaining 2,650 acres encumbered by flowage easement (1).

Both land acquired in fee and easements impinged upon approximately 150 ownerships [perhaps 290 individual parcels (6)]. In areas such as Peaslee Meadow Creek, Stark Brook, and along the Contoocook River in Henniker, easements to flood are held between the acquired property and elevation 420 ft msl (7). In addition, 500 acres along the Piscataquog River below the Everett Dam to the center of the Town of Goffstown are encumbered by flowage easement.

The data in Table D.6.3 represent project land and water area types as of October 1964. There has been relatively little shift in the status through September 1974 except for reported changes of agricultural land to brushland (4). All of the Manageable Resource Lands (see Table D.6.1) are subject to periodic flooding.

Sixty percent of the project boundary is marked (8). Gates are located at elevation 420 ft msl on each roadway that enters the project area. When the dams are storing flood water, the roadway gates are closed to block access; during the balance of the time the gates are open and the roads and lanes criss-crossing the landscape provide access to the permanent pools, access to project lands, and as a source of recreational opportunities.

2. Other Public Ownership

Clough State Forest is the only significant tract of publicly owned land within the analytical unit. The state forest is approximately 184 acres, extends to the center of the Piscataquog River below the Everett Dam, and abuts Corps property for about 3,500 ft. The land is steep (320 ft msl at the river and 700 ft msl at the top of the ridge) and is managed by the NH Division of Forestry (NHDF), Department of Resources and Economic Development (NHDRED). Clough

Table D.6.3. Project Land and Water Area Types.^a

Type	Acres	% of Total
Woodland	4,069	50
Agricultural Land	810	10
Brushland and Fallow Land	820	10
Permanent Water Surface	650	8
Contoocook River Pool	120	-
Elm Brook Pool	300	-
Everett Pool	130	-
Drew Lake	55	-
Canal No. 2	45	-
Bottomland and Marshland	1,186	15
Waterfowl Marshland	274	3
Structures, Rivers, Streams, Roads, etc.	330	4
Totals	8,139	100

^a New England Division. 1965. Hopkinton-Everett Reservoir Design Memorandum No. X (master plan for reservoir development). Waltham, Massachusetts.

State Forest is the remainder of the Clough State Park which existed prior to project land acquisition; 309 acres of the state park were acquired by the U. S. for project purposes. All or parts of the Dunbarton Town Forests (148 acres) and the Hopkinton Town Forest (40 acres) were acquired by the U. S. for the Hopkinton-Everett Lakes project (3, 6).

3. Private

All other lands contiguous to the project boundary are privately owned.

A land use map prepared from 1973 National Aeronautics and Space Administration photographs shows that only a small portion of the analytical unit has been developed to urban densities (9). The village of Henniker, the location of New England College, is displayed as about 640 acres of urban density development along the Contoocook River. Corps ownership extends to Bridge Street in the village; lands subject to flowage extend approximately 0.8 mi farther west (7). The balance of the analytical unit is shown as forested, improved open space (agriculture), or unimproved open space (old field). Individual properties are substantial and range from an average of 2.1 acres for village lots to an average of 113.1 acres for a commercial farm. While the average property sizes in Table D.6.4 reflect comfortable densities, these statistics also indicate the absence of single owners that control large acreages.

In 1967, there were approximately 116 occupied buildings (exclusive of the Henniker urban zone) within the analytical unit.

C. Resource Management

Under authority of Section 4 of the Flood Control Act of 1944 (16 U.S.C. 460d) and the Land and Water Conservation Fund Act of 1965, the NHDRED has a 5,900-acre lease from the Corps for public park, recreation,

Table D.6.4. Average Size of Land Parcels by Type of Use.^a

Type of Use	No. of Units in 4 Towns	Total Acreage of Units	Average Size
Farms producing for sale and home use	48	5,431	113.1
Rural places producing for home use only	41	2,604	63.5
Unoccupied tracts	75	3,187	42.5
Camps and Cottages	13	185	14.2
Rural residences	40	1,520	38.0
Village residences	33	68	2.1

^a New Hampshire Planning and Development Commission. 1955. Social and economic impacts (of) proposed Hopkinton-Everett reservoir. Concord, New Hampshire.

fish and wildlife, and forestry is shared by the NHDRED and the New Hampshire Department of Fish and Game (NHDFG) as long as these functions are consistent with the Corps master plan, the latest recognized forest and agricultural management practices, and mutually agreed upon annual management programs. The lease document carries explicit requirements for annual agreement between the state and the Corps for: capital improvements, operations and maintenance, staffing, timber management, fire prevention, planting and harvesting crops, law enforcement, preventing soil erosion, and handling waste materials (7). The lease also provides that: (1) the Corps retains the right to flood any or all of the lands and be held harmless from any damages to improvements made by the state, (2) the state shall remove property and restore the premises to a condition satisfactory to the Corps on expiration of the lease, (3) state proposals for water supply, sewage (sic), food handling, and housing bear official approval of the New Hampshire Department of Health, (4) all rates and prices to be charged by the state or a third party concessioner are subject to prior approval by the Corps, (5) all monies received from operations on project lands be used to offset operating and maintenance costs or reinvested in the project area or paid to the Corps, (6) management of fish and wildlife, including closings and regulation of harvests, be at the sole discretion of the state, provided such management is consistent with statewide practices, (7) the state may plant and harvest crops to provide food for wildlife except that the state is prohibited from producing crops solely to produce revenues, (8) lands within the total area leased to the state that can be used for agricultural or grazing purposes will be leased by the Corps, and (9) the state may harvest timber to further the development and conservation of forests and wildlife (7).

The outgrants for agriculture, grazing, rights-of-way, fish and wildlife and public recreation, and miscellaneous purposes are shown in Table D.6.5.

Table D.6.5. Outgrants for Agriculture, Grazing, Rights-of-Way, Fish and Wildlife and Public Recreation, and Miscellaneous Purposes, Hopkinton-Everett Reservoir.^a

Purpose	Grantee	Outgrants	Instrument	Rental Date	Term (yrs)	Annual Rent Paid (\$)	Acreage	Investment To 1974 (\$)	Planned (\$)
Agriculture	Stephen C. Bennett		Lease	1971	5	10	11.0	N/A ^b	N/A
Agriculture	Dwight W. Connor		Lease	1973	5	250	17.0	N/A	N/A
Agriculture	James A. Connor		Lease	1972	5	566	166.0	N/A	N/A
Agriculture	Lester E. Connor		Lease	1971	5	498	237.7	N/A	N/A
Agriculture	Lloyd L. Durgin		Lease	1973	5	50	8.7	N/A	N/A
Agriculture	Allen L. Isley		Lease	1970	5	33	13.8	N/A	N/A
Grazing	Karl Connor		Lease	1972	4	400	277.0	N/A	N/A
Grazing	Lester E. Connor		Lease	1970	5	22	8.2	N/A	N/A
Grazing	Lester E. Connor		Lease	1972	5	41	24.0	N/A	N/A
Grazing	Stanley Nelson		Lease	1970	5	16	11.0	N/A	N/A
Grazing	Stanley Nelson		Lease	1969	5	55	51.8	N/A	N/A
Grazing	Stanley Nelson		Lease	1971	5	83	14.0	N/A	N/A
Rights-of-Way	Summary	4	Easement	----	4 to Indef.	1	10.0	N/A	N/A
Fish & Wildlife -- Public Parks	State of NH, Dept. Resources & Econ. Dev.		Lease	1964	25	0	5,900.0 ^c	N/A	N/A
Other	Summary	6	Lease/Permit	----	4-10	10	2.8	N/A	N/A
Totals		23				2,035	6,754.0 ^d		

^a Office, Chief of Engineers. 1974. Outgrants-CW-Active. Washington, D. C.

^b Not available.

^c Master outgrant for fish and wildlife, public parks, and forest management.

^d All Manageable Resource Lands are outgranted; no explanation for 14 acre discrepancy.

1. Recreation

The Land Use Plan for Hopkinton-Everett Lakes project (3) discusses the following recreation sites:

Major recreation area: Everett Pool (Clough State Park)

Secondary recreation areas: (1) Elm Brook Pool
(a) North shore
(b) South Shore

(2) Drew Lake

Small recreation areas: (1) Stark Pond
(2) Canal No. 2 Wier
(3) Contoocook River Access
(4) Hopkinton Dam Overlook.

According to the records of the Program Management Branch, Engineering Division, New England Division, \$518,000 have been invested in recreation development by the Corps through 30 June 1973 from Code 710 funds. The state had not made any investment (10).

The Clough State Park portion of the Everett Pool recreation area consists of 200 acres available for recreational use plus 2 acres for administrative purposes. The lands designated for park purposes are on the east shore of the Everett Pool immediately upstream from the dam. Access is from the Everett Mansion Road. A lockable gate is located on the boundary of federal land and a control booth is located some 20 yards beyond the gate. During 1974 there were available for recreational use 189 family picnic sites, 1 launching ramp, approximately 1,000 ft of sand beach, 2 bathhouses, and parking space for 250 cars plus 4 car-trailer combinations (3, 8). In 1973 the park was open between the hours of 0900 and 1800 on weekends from 26 May to 15 June and seven days a week from 16 June until 4 September. The gate was locked at all other times.

All visitors to the park must pass the control station where a service charge is assessed. In 1973 the charge schedule was 75¢ per person 12 years and older and 25¢ per child for organized group use. Children under 12 years old, groups of underprivileged children, and NH residents 65 years of age and older were admitted free (11). Based upon service charge receipts and an estimate of free admissions, the NHDRED prepared a 7-year comparison of attendance at Clough State Park. As shown in Table D.6.6, visitation reached a peak in 1970 and has been declining since then. The sharp drop in attendance at Clough State Park in 1973 is partially explained by a closing of the park between 30 June and 12 July due to storage of flood waters (11).

State officials assume the comfortable carrying capacity of the facilities is comparable to the capacity of the parking lots. The gates are closed and further entry prohibited when the parking lot is full (13).

The New Hampshire Division of Parks (NHDP) operated Clough State Park in 1973 with the following staff: one manager (a local school teacher), one maintenance mechanic, three life guards, and eight laborers. Park personnel were on duty only during the period the park gate was open. State maintenance includes extensive cleanup of flood debris each spring and after inundation of the area during the use season, replenishing beach sand, removing dead trees, repairing the access road, and normal painting and repairing of buildings. The park staff is uniformed and vested with the power of constable within all areas covered by the NHDRED lease (11, 13).

The NHDP crew is assigned patrol and clean up responsibility outside the area specifically designated as Clough State Park. Assigned areas include a group camp site utilized by the New Hampshire Hospital, the Stark Pond Recreation Area, the Stumpfield-Mudgett Recreation Area,

Table D.6.6. Seven Year Comparison of Attendance, NH State Parks.^a

Year	Clough State Park	Summer Attendance all NH State Parks	% of Total Represented by Clough
1967	23,175	3,227,846	0.72
1968	28,848	3,554,673	0.81
1969	35,931	3,595,484	1.00
1970	40,740	3,946,964	1.03
1971	36,665	3,993,456	0.92
1972	38,967	3,906,142	1.00
1973	27,914	3,829,335	0.73

^a New Hampshire Department of Resources and Economic Development, Division of Parks. 1973. Internal Memorandum. Concord, New Hampshire.

and the extensive recreation use that occurs along trails (11, 12).

The North Shore site of the Elm Brook area was developed as a day use beach area "... for residents of Hopkinton and other towns to the north" (3). The state assumed that a "... yearly sublease of the recreation site by the town of Hopkinton ..." (3) would occur. The South Shore site consists of a formal parking area, two launching points (although two additional drowned road endings are used informally for launching and day use), and trash recepticals. Approximately \$175,000 has been invested in facilities in the Elm Brook sites by the Corps (10). Until 30 June 1968 the state crew from Clough State Park performed oversight, maintenance, and clean-up in the Elm Brook area. Thereafter, the state ceased maintenance of the facilities (5, 12) and the Elm Brook areas were deleted from the lease. There has been minimum development at Stark Pond, the south end of Canal No. 2, the Contoocook River site, and at the sites in the Drew Lake recreation area. The state does not formally clean any of these areas, although some work is performed in an undesignated site where Canal No. 2 joins Drew Lake.

The NHDP reported expending \$20,600 for operating expenses and collecting \$11,100 in fees and charges in 1973 (11); that is, about 53% of the cost of operating the facility is paid for by users. The annual operating budget of the division is approximately \$2.4 million (including bond principal and interest charges of \$900,000) (13); thus, Clough State Park operations represent approximately 1.3% of the park budget and 0.73% of reported attendance.

All sites except Clough State Park are open to public use all year and they are used regardless of time of year or state of maintenance. Corps project personnel patrol the project lands and assist in maintaining the formally and informally used recreation areas.

Corps maintenance of the Elm Brook area has been accomplished for 2 years by contractors. The contracts average \$200 per week for a 10-week season. Corps personnel find that such contracts eliminate an important opportunity for visitor contact work and, since funding has only been for the recreation season, contracts cannot begin until too late in the spring (5).

The NHDP reported 27,914 attendance to Clough State Park in calendar year 1973 (see Table D.6.6), yet Corps data shows annual visitation to the park of 108,500 recreational days. Corps data further indicate a visitation of 150,400 recreational days to the project during June, July, and August, and a total visitation to the project of 274,100 recreational days in calendar year 1973 (8). No Corps or NH studies have been conducted to ascertain the origin or socio-economic characteristics of the visitors (13, 14).

Corps estimates of visitation by month show 14.2% of 1973 visitation occurred in the winter months (December, January, and February) (8). The Bureau of Off-road Vehicles, NHDP, has planned a snow mobile trail network for the Hopkinton-Everett project. Approximately 75 mi of former U.S., state, and town roads are cleared, but the roads, except where year around residences are served, are not plowed. The roads and the lake surfaces are ideal for snow mobiles. NHDP proposes to mark the trails, brush the surfaces, and police the activity. No cost was attached to the project (13).

The NHDP is basically in agreement with the preliminary proposals of a revised master plan that is being drafted by the Corps (10, 13). The agency recognizes that the Corps' plan must accommodate the primary purpose of the project - flood control (13). The NHDP, presumably with the approval of NHDRED, has tentatively agreed to share with the Corps a \$300,000 facility improvement program. The

proposed sharing would involve \$150,000 for access roads by the Corps from Code 710 funds and \$150,000 in recreation facilities by the state (13).

The 1962 Land Use Plan (3) states boating would be one of the recreational attractions of the lakes, but because the permanent pools are limited in size, motorboats "... will be prohibited from use of the water areas except for special events". NHDRED does not permit motorboats on the lakes in order to further water safety, water quality, and recreation experience (3, 5).

2. Lake Resources

During the project planning period (1957-1960), the water of the Contoocook River was polluted by paper mill waste discharged upstream from the project (1, 15). For this reason, the USF&WS, with concurrence of the NHDFG, recommended that the Elm Brook pool be segregated from Contoocook River flowage (15). The Piscataquog River, with high quality water, was classed as the second most important trout stream in south-central NH. The river between Everett and Goffstown was stocked annually with 6,000 yearling trout (13). Stark Brook, Drew Lake, Stumpfield Creek and Elm Brook flowed entirely within the analytical unit and preproject evaluations do not indicate polluted conditions. The relative sizes of the permanent pools and waterfowl impoundment areas created by the project are shown in Table D.6.7. The 430 acres of open water represented by the Everett and Elm Brook pools support a good to excellent warm-water fishery. The Division of Inland and Marine Fisheries, NHDFG, manages the fishery. As time and funds permit, the division applies the following management practices: pond surveys, pond reclamation, and warm water fish stocking (16). Water quality is improving in the Contoocook River (5) and an improved fishery is possible in the Hopkinton Pool.

Table D.6.7. Permanent Pools and Waterfowl Impoundment Areas.^a

Water Source	Permanent Water Bodies Created		Size (Acres)
	Pools	Waterfowl Impoundment Areas	
Contoocook River	Hopkinton Pool	---	120
Piscataquog River	Everett Pool	---	130
Internal Drainage	Elm Brook	---	140
		Elm Brook	160
	Drew Lake	---	55
	Canal No. 2	---	45
		Stark Pond	19
		Stumpfield Pond	95
Total			764

^a New England Division. 1965. Hopkinton-Everett reservoir design memorandum No. X. (master plan for reservoir development). Waltham, Massachusetts.

Recommendations made by the USF&WS for modifications in the Everett Dam discharge works and for minimum discharges downstream were incorporated in the project. Thus, the Piscataquog River below Everett Dam is still a trout stream and is stocked with more trout than before project construction (16).

3. Wildlife

Three of seven areas recommended by USF&WS for waterfowl habitat development were incorporated in the project: the 160-acre upper extremity of the Elm Brook Pool (Area 6), the 95-acre pond upstream from the Stumpfield-Mudgett Road (Area 5), and the Stark Pond Waterfowl Refuge (Area 7) (15). Four of the waterfowl impoundment areas originally recommended were included in the Corps' 1965 master plan for reservoir development (2). The four areas had not been created by the fall of 1974 even though NHDFG officials reported sighting waterfowl flocks numbering around 500 individuals in the project area and indicated that was a sizeable increase over preproject utilization rates (4). The NHDFG has established wood duck nest boxes at the waterfowl impoundment areas (17).

Stark Pond was a NH wildlife management area during project planning. State-federal aid project funds of \$10,907 were invested in developing the waterfowl impoundment area (4). Plans to raise the dam elevation and enlarge the open water swamp were opposed by the New Hampshire Historical Society (NHHS) because of possible damage to the Stark Cemetery. The Corps acquired the right to flood lands owned by the town of Dunbarton and fee title to the Stark Cemetery (for which the NHHS acted as trustee). The Corps used project funds to relocate the Stark Cemetery on Mansion Road near the intersection with Barnard Hill Road. The dam can now be raised 3.5 ft and the ponded area increased from 19 acres to 92 acres, of which 60 acres would be 0 to 2.5 ft deep (15).

Major NHDFG management emphases in the project area are upon increasing waterfowl numbers by manipulating the water levels in the waterfowl impoundments, increasing opportunities for waterfowl hunting, keeping all roads and lanes open even if not maintained, maintaining or increasing the 30 to 35 active beaver flowages, and improving habitat for upland birds. Regarding upland birds, NHDFG personnel estimate that 89% of river bottom farms in NH are now forested and they favor Corps leasing of river bottom land to farmers or any program that will keep river bottom land in open cover (4).

NHDFG reports indicate that all upland species found in NH, except bear and moose, are found within the area. White-tailed deer is the most important game animal in the analytical unit. Hunter success is rated as good (4, 16). The major factor limiting deer populations is winter severity (no correlation between acreage of softwoods where deer concentrate in the winter and winter-kill was cited) (4). NH deer populations reached record levels in the 1967-68 season, but severe winters in 1969-70 and 1970-71 reduced the herd by half (4). The NHDFG gives extensive consideration to deer yarding areas and winter-kills in southern NH (16).

NH has a put-and-take pheasant program. In the 1970-72 biennium 17,200 cock pheasants were stocked with 20% released on Corps lands (about 1,147 birds at Hopkinton-Everett) (16).

NHDFG officials find that planning decisions tend to favor views of the master lessee, NHDRED. NHDFG officials feel that planning decisions for the leased property favor the views of the master lessee, the NHDRED. Points of NHDFG and NHDRED conflict are: (1) motorboats - NHDFG believes the fishery resource, particularly in the Everett pool, is underutilized and that permitting the use of power boats would induce more fishermen to the permanent pools, but NHDP

concerns have prevailed and motorboating is prohibited; (2) the NHDFG believes that the roads and lanes within the project area should be kept open to facilitate access for hunters, but NHDP favors closing all but a few designated roads that provide access to major recreation areas thus decreasing maintenance and patrolling costs; (3) the NHDFG favors extensive areas of shallow water to enhance waterfowl habitat in the Elm Brook pool, but the water is kept as deep as possible to facilitate recreation use of the Elm Brook Recreation Area even though the principal rationale for the development of the North site has not materialized and the area has returned to Corps management; and (4) the NHDFG would like to have access for fishermen to the boat launching ramp in Clough State Park without passing through the entry gate but the NHDP considers the facility part of the state park and subject to the same hours of operation as the other day use facilities (4). Provisions to alter the later situation will be recommended in the Corps' updated master plan (10).

4. Other Land Use

Management of the forest resources is accorded status equal with recreation, fish, and wildlife in the state lease (7) and in state and federal plans.

The project includes approximately 6,526 acres of forested land. Some sites are suitable for the production of white pine; most of the remaining forested area is adapted to upland hardwoods, primarily red oak, red maple, sugar maple, and beech; a relatively small part of the area is suitable only for growth of swamp hardwoods primarily red maple and elm (6).

Guidelines for forest management are stated in the NH Land Use Plan: "The Hopkinton-Everett Reservoir forestry operations will be similar to those carried on now at the other flood control reservoirs

in New Hampshire ... the Forestry Division first will log off some stands of trees ... in order to obtain funds ... to carry on ... timber stand improvement and reforestation of the leased reservoir lands." (3) Management is to include (1) special attention to waterfowl impoundment buffer zones (particularly, the Dunbarton Town Forest Area at Stark Pond), (2) cooperative work in reserve recreational areas, (3) special management of open fields "... that no farmer wishes to lease for agricultural purposes", and (4) assignment of deer winter areas to the NHDFG for management.

The stipulation that only earned income could be used to manage project forests was defended by NH Division of Forestry (NHDF) personnel on the basis of lease prohibitions for transferring funds from the project to support division activities elsewhere and the understanding that NH statutes prohibit expenditure of state appropriated funds on federal lands (13). The position was contradicted by the NHDF proposal to invest \$150,000 in Clough State Park improvements (13).

As of 1974 there have been no commercial timber sales, hence no income and no investment in silviculture. State officials reported that the land had been heavily timbered prior to acquisition by the Corps and that several more years of natural growth will be required before a sale is considered (13).

Six sand and gravel extraction operations are active on flood easement land. Some of the excavations are connected with pits formerly above 416 ft msl. The result is an expansion of the area of inundation when the reservoir is full (18).

Drew Lake was formerly a posted private lake. The lake offers swimming, boating, and fishing and the surrounding countryside is wooded and hilly - conditions that attract permanent and seasonal housing development. NH recommended Corps land acquisition between

the lake and Bassett Mill Road on the west and south and Sugar Hill Road on the north (3). The land was not acquired and in 1974 at least six permanent houses were under construction along both sides of Bassett Mill Road.

Reservoir land acquisition policies in effect while the Real Estate Division acquired project land prevented acquisition of a block of high land along what was the Stumpfield Road. Seven residences, including one riding stable, are scattered along the road and the relocated U.S. 202. This block of land is now surrounded by federal land and is the best land adjacent to the Elm Brook pool.

The Corps, in accord with the NH lease and land use plan, has out-granted to adjoining farmers 454.2 acres for agriculture and 386.0 acres for grazing (see Table D.6.5). Specific land treatment practices are cited as conditions of the leases. All but one of the 12 instruments is for a 5 year term, a length compatible with interim uses. The lessees pay annual rent of \$2,024 of which 75% (\$1,518) is returned to the county governments through the state.

Farm use of the land is complementary to wildlife management objectives; NH would recommend additional bottomland acreage be leased by the Corps if there were farmers willing to accept the land and keep it open. Two problems exist: farming is marginal and farmers are unwilling to invest in the required land treatment practices since the land may be flooded during the summer season; additionally, the short term tends to discourage husbandry. Also, farmers have become disgruntled because of heavy use of the area by sportsmen and have attempted to post their leased land along with land held in fee. Project staff mentioned their uncertainty as to the right of the lessee to so post federal land (5), yet the Chief, Real Estate Division, New England Division, advised the Director NHDFG that "... the lessee

would not have the legal authority to post the leased land to prohibit hunting and fishing." (19). No other citation to Corps policy was offered.

5. Resource Use Controls

The Corps' organization for recreation and resource management consists of a Basin Manager, part time clerk, and a park ranger for all project operations in the Merrimack River Basin. The Basin Manager is officed at the Franklin Falls project. He supervises activity at five projects in the basin including Hopkinton-Everett.

There is one resident flood control dam aide (wage grade 5) and a nonresident assistant at both Hopkinton Dam and Everett Dam. During 1974, a summer park technician was hired for 700 man hours of work. The technician was the only uniformed Corps person at the project. The Corps project staff patrols boundaries, inspects agricultural and grazing lands outgranted to farmers, and administers recreation areas at Drew Lake, Elm Brook, and Contoocook River during the summer months. They estimate that 85% of their reported time is devoted to recreation and resource work and only 15% to dam maintenance, such as clearing debris from the trash racks (5).

All technical recreation and resource management support is provided by the Division staff in Waltham, MA. The Division has successfully encouraged the states to accept management responsibility for recreation and fish and wildlife at completed projects. Part of the success can be attributed, as in the case of the Hopkinton-Everett project, to early consultation with state agencies and acceptance of state recommendations. For example, a state study of social and economic impacts preceded inclusion of the project in the Merrimack Plan by the Chief of Engineers. State recommendations to lessen negative impacts and increase benefits were incorporated in the General

Design Memorandum by the Corps, and the state 1962 land use plan served as a base document for the Corps 1965 master plan.

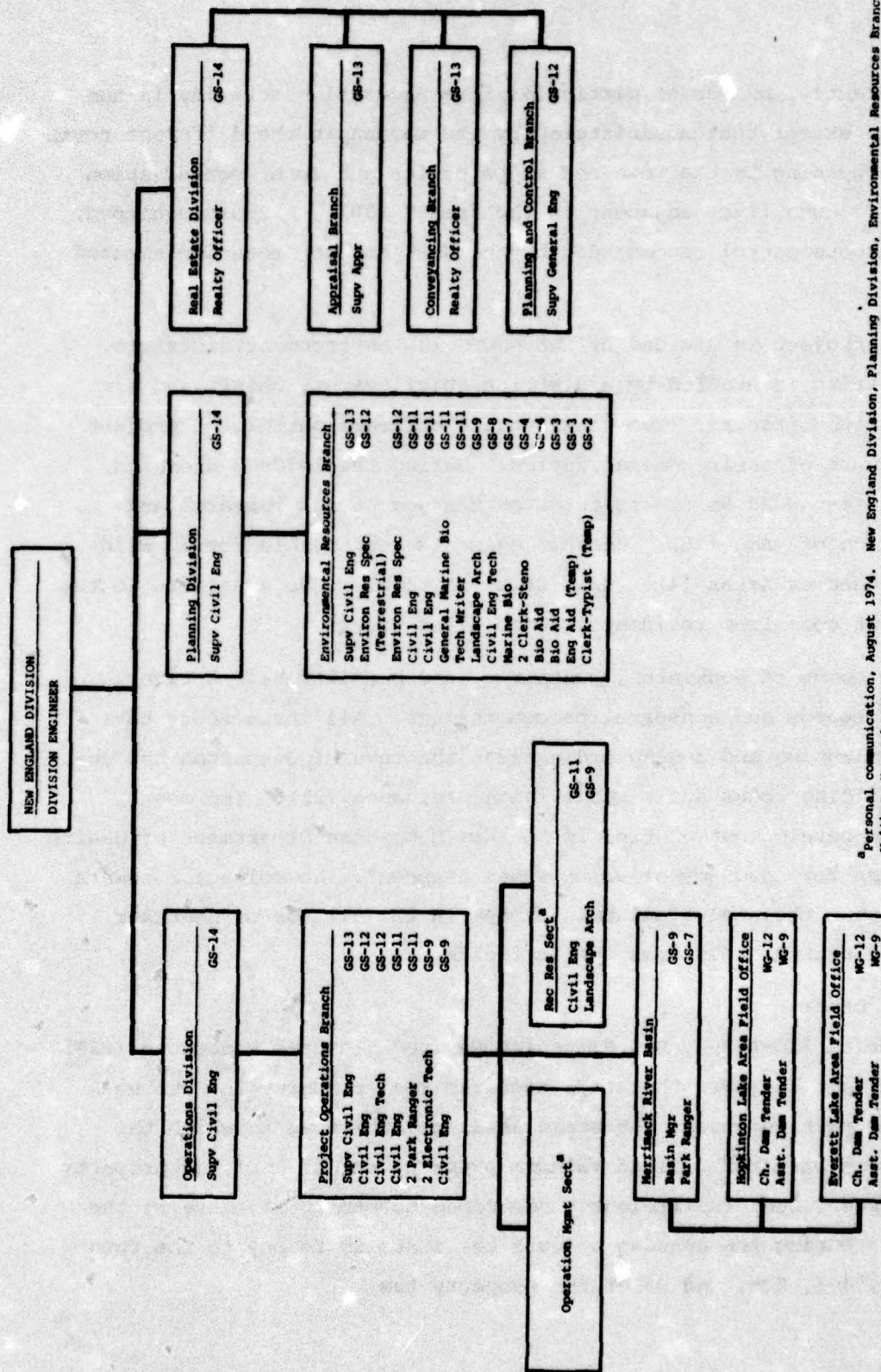
Until 1974, all recreation-resource management work was performed by the Environmental Resources Branch, Planning Division and the Conveyancing Branch, Real Estate Division. The Environmental Resources Branch, composed of 14 permanent staff members, is responsible for all recreation planning from master plans to contracting for facility construction. The supervisor estimates that three engineers and one landscape architect spend 75% of their time devoted to recreation-resource management problems. During 1974 a Recreation-Resource Management Section was formed in the Project Operations Branch, Operations Division. One GS-11 civil engineer and one GS-9 landscape architect comprised the staff in 1974 and devoted 100% of their time to recreation-resource management activities (18). The relationships at the division level are shown in Figure D.6.2.

The Merrimack Basin Manager reports to the Chief, Project Operations Branch. The work of rangers who are assigned to the basin manager's office or to a project is the responsibility of the Recreation-Resource Management Section.

The Real Estate Division annually inspects the public and private outgrants.

Division personnel are of the opinion, confirmed by state personnel, that state spending priorities are influenced by state ownership, hence areas leased from the Corps receive low priority for funds. Corps policy makers assume that since all project lands are leased to the state there is little need for federal capital or management funds. Both state and division personnel feel that the planning process for Hopkinton-Everett results in adequate management, but project personnel feel that both state and Corps investment and staffing are inadequate (5, 10, 13).

Figure D.6.2. Recreation-Resource Management Interrelationships - New England Division.



^a Personal communication, August 1974. New England Division, Planning Division, Environmental Resources Branch, Waltham, Massachusetts.

Currently, NH has no particular fire prevention activity in the area "... except that administered by the warden in the different towns and the checking by the town and state police and (one) conservation officer ... who lives adjacent to the area." (20). A radio-equipped, multi-purpose patrol recommended by the NHDF had not been implemented in 1974.

The project is divided by two NHDFG law enforcement districts. Each district is staffed by a district chief, deputy chief, and six conservation officers. Two conservation officers patrol the project area as part of their general duties. During the 1970-72 biennium, the NHDFG expended 9% of its funds on management and research and propagation of game (16). One biologist is responsible for 50 wildlife management areas (4). Only 26.9% of total funds available to the department come from resident license sales (16).

The towns of Hopkinton, Dunbarton, and Henniker have active planning boards and conservation commissions. All three towns have adopted planning and zoning ordinances; the town of Dunbarton has enacted building codes and a subdivision ordinance (21). The most effective development control is the New Hampshire Department of Health inspection for adequacy of waste water disposal. No collector sewers exist within the analytical unit except in the village of Henniker. All other systems rely upon septic fields.

6. Other

Section 216-A:3-a, New Hampshire Revised Statutes Annotated (RSA) provides that whenever the state acquires real property for recreational or park purposes, the state shall pay the town in which the property is situated full ad valorem property taxes until the property is declared "open" (sufficiently developed to permit safe use by the public). During the ensuing 5 years the state is to pay to the town 80%, 60%, 40%, 20%, and 0% of the property tax.

RSA 219:32 provides that towns may request payment by the state of one-half the property tax that would be paid upon national forest lands and land held by the state for operation and development as a state forest.

The Merrimack River Flood Control Compact (PL 85-23) provides that the Commonwealth of Massachusetts will pay to the affected NH towns 70% of the property tax lost by reason of federal land acquisition for the construction and operation of flood control works.

III. KEY FINDINGS

A. Recreation

1. The public land acquired for the Hopkinton-Everett Lakes project is inundated only rarely (estimated total flooding once in 35 years, and then for only 30 days) and represents the largest single area open for extensive outdoor recreation, including hunting and fishing, in southern NH.

2. Outdoor recreation planning and administration is complicated by the characteristics of the disparate lakes and ponds that exist during the majority of each year and by project operating requirements. Only small portions of the Elm Brook, Everett, and Contoocook Pools have sufficient size and depth to make investment in recreation facilities feasible. The shorelines of these pools are the first to be inundated when flood waters are impounded.

3. There are two developed recreation areas: Clough State Park and Elm Brook Recreation Area. Day use facilities in Clough State Park were constructed by the Corps. The State of New Hampshire manages the park area under a master lease. Access is completely controlled and entry fees are collected by the state. The park is open only during daylight hours between 1 June and Labor Day. During this period the state crew patrols the land leased from the Corps lying immediately adjacent to the park and cleans recreation areas at Stark Pond and Stumpfield-Mudgett Pond. The cost of operating the park exceeded income by \$11,503 in fiscal year (FY) 1972 and \$9,500 in FY 1973. Facilities constructed by the Corps in the Elm Brook area were maintained by state crews until 1970. The area is low-lying and is well suited for intensive day use. NHDP ceased maintenance and requested that the area be deleted from the lease. The Corps now maintains the area with contract maintenance personnel. Both areas may be

inundated by flood waters during intense summer storms; Clough State Park was closed for two weeks in July 1973 because of flooding.

4. Extensive recreation activities occur on all other project land in all seasons. State cleanup work during the 3-month summer season only extends from Everett Dam to Drew Lake during daylight hours; conservation officers of the NHDFG patrol the federal land at the same intensity as other lands. Thus, even though 5,900 of 7,186 acres of manageable resource lands are outgranted to NH for multiple use resource management, Corps project personnel must: perform cleanup and visitor contact work during the entire year in the Elm Brook area, at drowned road ends, and in other areas where extensive recreation activities occur; conduct patrols in the area after dark; and perform visitor contact activities throughout the entire project during the 9 months the state park is closed.

5. NH plans to invest \$150,000 in state recreation facilities to match a Corps investment of \$150,000 from Code 710 funds.

6. The New Hampshire Bureau of Off-Road Vehicles is beginning an intensive trail program that will utilize unplowed roads and lanes and the frozen surfaces of the permanent ponds in the Hopkinton-Everett project area. This program will further extend the useful recreation season for Corps lands.

7. It was estimated in the general design memorandum of 1958 that a \$180,000 investment in recreation facilities would be adequate; actual federal investment in recreation facilities through 30 June 1973 was \$518,000.

8. The Corps has been forced to rely on contractors to maintain the Elm Brook Recreation Area. The method proved to be unsatisfactory because no public contact work is accomplished and funds are not

available in time to perform needed maintenance work before the public begins to use the facilities.

B. Fish and Wildlife

1. When construction began, the Contoocook River supported moderate populations of smallmouth bass, chain pickerel, yellow perch, and bullheads; the Piscataquog was classed as the second most important trout stream in southern NH and supported a natural trout population supplemented by annual stocking of 6,000 yearling trout. Drew Lake contained populations of brown bullhead, pickerel, yellow perch, and sunfishes. Construction of the project affected stream fishery habitat by inundating a portion of the Piscataquog and by periodic and temporary flooding of tributaries of the Contoocook and Piscataquog Rivers.

2. Project construction and operation have increased the warm water fishery. The design of Everett Dam was modified to maintain a constant pool elevation and to release cold water flows into the Piscataquog. Loss of habitat above the dam has been partially compensated for by increased releases of fingerling and yearling brook and rainbow trout by NHFGD. There is moderate fishing pressure on the 130-acre Everett pool even though boats with engines are forbidden; fishing pressure elsewhere is minimal.

3. All of the approximately 5,900 acres outgranted to the State of NH is subject to habitat management, as agreed to by participating state agencies. Big game and upland game populations in southern NH have been declining commensurately with the decline of farming. Many practices that interrupt the succession from old field to forest will increase certain game populations. The 851.2 acres outgranted by the Corps for agriculture and pasturage are considered important for wildlife.

4. Good populations of small mammals and native upland game birds are hunted in the project area. The NHDFG maintains a put-and-take pheasant population because (1) of a legislative mandate, (2) there is open land to facilitate hunting, and (3) the land is open to the public. Deer is the most important game species in the region and populations are directly related to the winter severity. The acreage of softwood forest where deer concentrate in winter is an important management consideration. The NHDFG does not have an active upland game habitat program at Hopkinton-Everett but an intensive deer research program is being conducted.

5. The USF&WS, with the concurrence of the NHDFG, urged project modifications that would enhance the preproject Stark Pond Waterfowl Refuge and create seven areas with prime waterfowl habitat. The modifications to (1) create upper Elm Brook and Stumpfield-Mudgett marshes, (2) enhance Stark Pond, and (3) protect water quality in lower Elm Brook were incorporated in the project.

C. Corps and Contiguous Land Use

1. All land that abuts Corps land is privately owned except Clough State Forest which adjoins Corps land at the Everett damsite.

2. Planning services are available through the Central New Hampshire Regional Planning Commission but the commission's program is advisory to the town governments. The towns of Hopkinton, Dunbarton, and Weare have planning and zoning ordinances and Dunbarton has building and subdivision ordinances; the town of Weare exercises no control over development. All towns have active conservation commissions. The predominant municipal and isolated residential water supply is wells; waste water disposal is by septic tanks and leach fields. One block of property lying astride relocated U. S. 202 was not acquired by the Corps. It is now an island of private land.

Seven residences, including one riding academy, are scattered along the remnants of the old Stumpfield-Mudgett Road.

3. Only six houses have been constructed within the analytical unit since the project was completed. They add to the small group of nine permanent houses built immediately west of Drew Lake prior to construction of the project. They were built upon land that the State of NH in 1962 recommended for public acquisition as a public recreation area at Drew Lake.

4. The Corps has outgranted 5,900 acres to the State of NH for "public park and recreational, fish and wildlife and forest management purposes". The state is charged with developing a general development plan for the renewable natural resources on these lands and an annual management program to itemize specific implementation programs. Both the plan and programs are to be consistent with the Corps master plan. The state land use plan was prepared by the New Hampshire State Planning and Development Commission in 1962; the current Corps master plan was submitted for approval in 1965. Activities of the NHDP have been covered in Section A, Recreation; and activities of the NHDFG have been covered in Section B, Fish and Wildlife. The NHDF provides protection from wildfire through the same town fire warden system that protects all forested land in NH; no forest management practices will be accomplished until the forest stand develops sufficiently to yield a merchantable crop. Proceeds from the sale of timber will be reinvested in the forest stand. The policy of the NHDF which prohibits use of appropriated state funds on land not owned by the state is in conflict with the NHDP's intent to invest state funds in facilities on land leased from the Corps.

D. Real Estate Programs and Practices

1. Contiguous farmers and former farmland owners are given preference for agricultural and grazing outgrants.

2. Antagonism is building between agriculture and grazing grantees and sportsmen because of real or imagined loss of livestock and damage to fences and other property sustained by the farmers. The farmers post private land, but the Real Estate Division, New England Division, has ruled that "... lessee(s) (d0) not have the legal authority to post the leased land to prohibit hunting and fishing."

3. The real estate staff rely upon project personnel to conduct compliance inspections on lands leased for agriculture and grazing.

4. Farming operations are marginal. Some farmers point out that the Corps requires investment in fertilizer and seed but offers no protection against loss when the land is flooded during the productive summer season.

E. Corps Organization

1. The Hopkinton-Everett complex (two dams) is one of five flood control projects in the Merrimack River Basin under the general supervision of a GS-9 basin manager headquartered in Franklin Falls, NH. Seasonal park technicians (700 man hours at each project), who are responsible for law enforcement, patrol, and public contact work at the five Corps projects in the basin, report to the basin manager. The basin manager estimates that five full-time park rangers are needed.

2. All recreation-resource technical support comes from the Engineer Division offices in Waltham, MA. Recreation and fish and wildlife planning, including the preparation of master plans, site plans, and outdoor recreation data reports, has been centralized in the Environmental Resource Branch of the Planning Division. The branch is staffed by 14 permanent employees with three engineers and one landscape architect spending an estimated 75% of their time on recreation related work.

A Recreation-Resource Management Section has recently been established within the Project Operations Branch, Operations Division. The basin managers report to the Chief, Project Operations Branch; the Recreation Resource Management Section now has responsibility for the ranger force and for recreation-resource information, including visitor surveys. The section is staffed by one civil engineer (GS-11) and one landscape architect (GS-9).

3. The project is manned by a damtender and an assistant damtender at the Hopkinton Dam and a damtender and an assistant damtender at the Everett Dam. Both damtenders are quartered in Corps housing adjacent to the dams. The damtenders estimate that 85% of their time is devoted to recreation-resource management activities because they are the only public employees regularly available to visitors even though the manageable resource land is leased to the state. Project personnel feel compelled to patrol the project land regularly and complain that state personnel and management is inadequate for the realization of project potentials.

F. Other

1. Responsible state officials endorse transfer of project lands to the State of NH. They contend that the level of management would not be less than now and that funding from state sources would increase because the inherent legislative reluctance to appropriate funds for use on land now owned by the state would be overcome. It should be noted that all land associated with Corps projects in NH are outgranted to the state under lease instruments similar to the Hopkinton-Everett agreement.

2. When and if lands were transferred to the state, the provisions of Section NHRSA 216-A:32 and 219:32 would apply. Under these provisions, payments in lieu of taxes are made by the state to the towns in which state park and state forest lands are located.

3. The towns affected by the project receive from the Commonwealth of MA, in addition to 75% of all lease fees collected by the Corps of Engineers, 70% of the property tax the land acquired by the U. S. would yield under present tax rates, according to the terms of the Merrimack River Valley Flood Control Compact.

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7. FOSTER JOSEPH SAYERS DAM AND RESERVOIR

North Atlantic Division

Baltimore District

Pennsylvania

I. SETTING

A. Location

The Foster Joseph Sayers Dam and Reservoir is located in central Pennsylvania about 14 miles (mi) southwest of Lock Haven. The project lies within Liberty, Howard, and Boggs Townships in Centre County. There are two incorporated communities in the vicinity of the reservoir including the Borough of Howard, on the southeastern shore at the lake's midsection, and Blanchard, on Bald Eagle Creek about 1 mi below the dam. Curtin is an unincorporated village on the southeastern shore in the upper reaches of the reservoir. U. S. 220 which runs from Waverly, New York to Covington, Virginia parallels the reservoir shore to the northwest. I 80, which crosses central PA in an east-west direction, borders the project to the southwest. Regional and local accessibility are very good (Figure D.7.1).

B. Authorization and Purposes

The Foster Joseph Sayers Dam and Reservoir project was authorized by the Flood Control Act of 1954 (PL 83-780). The project was originally authorized for flood control.^a

Sayers (completed in 1969) was one of three projects authorized by the 1954 Act in the West Branch Susquehanna River Basin. The other two

^aThe Secretary of the Army has been authorized, since 1944, to construct, maintain, and operate public park and recreational facilities at water resource development projects. 16 U.S.C. 460d. Since 1946, the Corps has been required, when consistent with a project's primary purposes, to make adequate provision for the conservation, maintenance, and management of wildlife resources. 16 U.S.C. 663(a).

F. J. SAYERS RESERVOIR PENNSYLVANIA

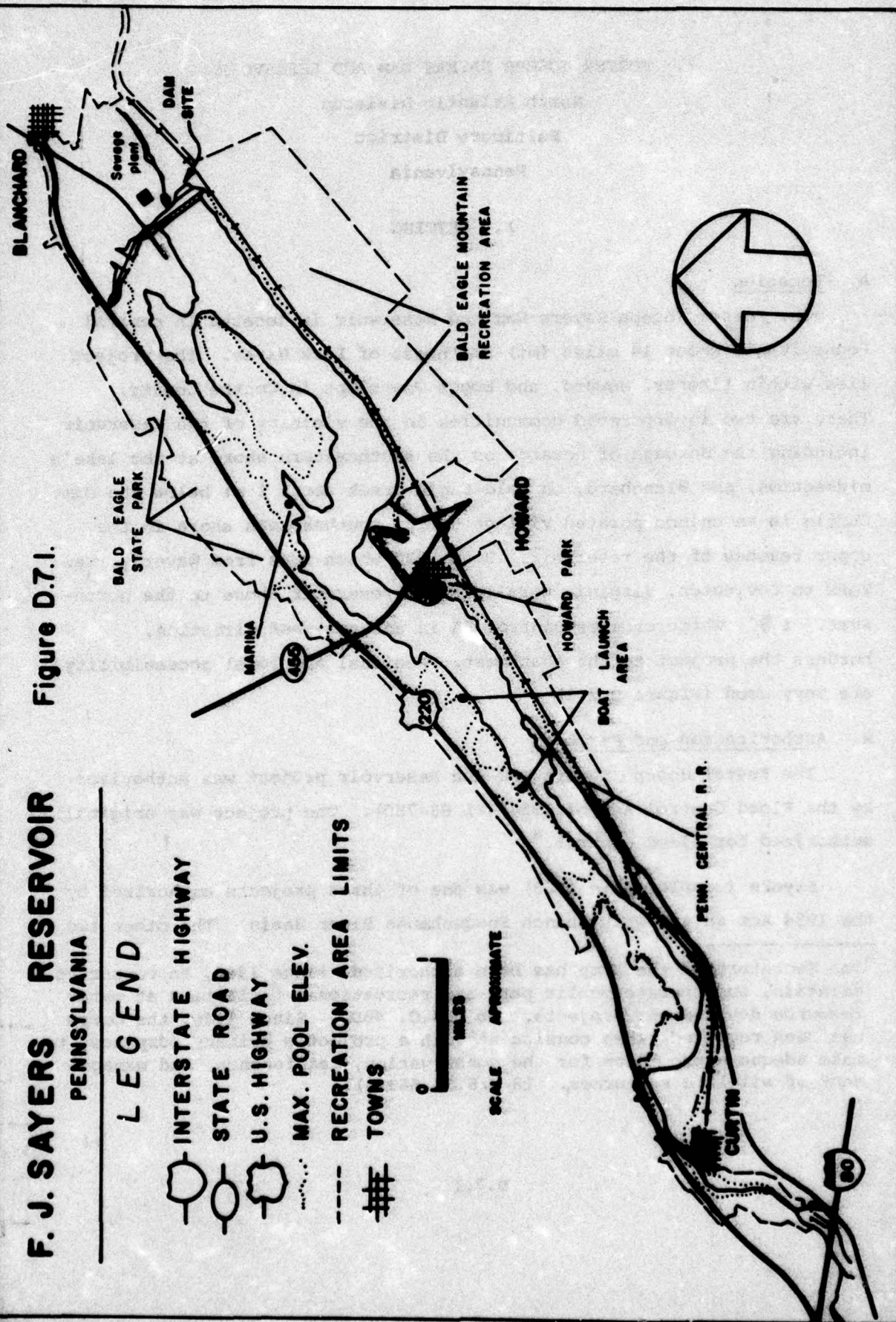
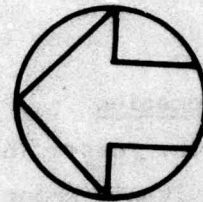
Figure D.7.1.

LEGEND

- INTERSTATE HIGHWAY
- STATE ROAD
- U.S. HIGHWAY
- MAX. POOL ELEV.
- RECREATION AREA LIMITS
- TOWNS



SCALE APPROXIMATE



were Bush Dam on Kettle Creek (completed in 1962) and Curwensville Dam on West Branch (completed in 1965). The George B. Stevenson Dam on First Fork Sinnemahoning Creek, built by the Commonwealth of Pennsylvania in 1956, was the first constructed in the series in the West Branch Basin (1). The Sayers project is on Bald Eagle Creek, a tributary to the West Branch Susquehanna River which is a 240 mi long river rising in Cambria County and entering the Susquehanna River at Sunbury.

C. Features

Bald Eagle Valley is relatively flat and is rimmed by the Allegheny Plateau to the northwest and Bald Eagle Ridge to the southeast. The valley extends 70 mi from Altoona to Lock Haven, PA.

The reservoir is long and narrow with a regular shoreline having only a moderate degree of perforation. The slopes to the southeast along Bald Eagle Mountain are steep ranging from 25 to 40%. The lands to northwest are rolling to hilly. The surrounding lands are densely forested in various species of oak, birch, hickory, elm, maple, pine, hemlock, and cedar. Valley lands are cultivated and used for grazing. Lands lay fallow in annually flooded zones (1).

The project's prime function is to control flood crests on Bald Eagle Creek and the West Branch Susquehanna River below Lock Haven. The Flood of 1973 (Hurricane Agnes) caused the waters of Sayers Reservoir to flow over the spillway for the first time to a depth greater than 1 foot (ft) (2).

During normal stream flows, the height of the recreation pool is 630 feet above mean sea level (ft msl) covering an area of 1,730 acres from April to October (Table D.7.1). During the winter, the pool is drawn down to 610 ft msl and to a size of 630 acres. This significant drawdown each year is to allow for more storage capacity during winter

Table D.7.1. Resource Statistics, Foster Joseph Sayers Dam and Reservoir.^a

Date of Authorization	1954
Rights in Land Acquired Between	1963-1974
Date of Impoundment	1969
Date of Full Operation	July, 1969
Lake Size When Water Level is at:	
Spillway Elevation	3,450 acres
Normal Pool Elevation	1,730 acres
Normal Minimum Pool Elevation	630 acres
Minimum Design Elevation	630 acres
Water Fluctuation - Summer Recreation Season	20 ft
Shoreline at Normal Pool	
Winter pool (610 ft msl)	10.6 miles
Summer pool (630 ft msl)	20.4 miles
Held in Fee Simple by Corps	20.4 miles
Land Area Managed by Corps	
Total Land in Project	7,991.0 acres
Fee Title in U. S.	7,574.0 acres
Easements to Flood	417.0 acres
Project Operations Land	494.0 acres
Manageable Resource Lands	5,350 acres in summer ^b 6,450 acres in winter ^c

^aBaltimore District. 1974. Foster Joseph Sayers Dam and Reservoir, Bald Eagle Creek, Pennsylvania; draft design memorandum no. 3C; master plan for reservoir development and management. Baltimore, Maryland.

^bTotal Project Land minus (Land Flooded at Normal Pool + Project Operation Lands + Easements).

^cTotal Project Land minus (Land Flooded at Normal Minimum Pool + Project Operation Lands + Easements).

flooding periods. Since the waters flowing into Sayers are alkaline, release waters also assist in neutralizing acid flows from mine drainage into the waters of the West Branch downstream (1).

II. LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

A. Analytical Unit

The analytical area is roughly delineated by U. S. 220 and the Penn Central Railroad which generally run parallel to the northwestern and southeastern shores of Sayers Reservoir. The Corps owns lands beyond these two transportation corridors in the northeastern section of the project. At these points the ridges of the hills just beyond the Corps' property line serve as the general limits. To the northeast, the Borough of Blanchard serves as the boundary and I 80 delimits the analytical unit to the southwest (Figure D.7.1).

The Sayers project has not had a measurable impact on contiguous land use in its 6-year history. Little or no demographic change has been recorded, and except in the area near the I 80 - U. S. 220 interchange, land values appear to be remaining about what they were when project development was first begun. Although some prospect of development does exist, there has been little or no discernable land use change in contiguous areas.

The exception to this is at the new I 80 - U. S. 220 interchange. It is difficult to tell whether the impact of the lake or the highway is strongest, but there has been a marked, sudden increase in land values in this area. Mass transfers in ownership have occurred; lands have been consolidated and sold as single tracts for speculative purposes. In some cases, lands were subdivided illegally, not meeting the requirements of Centre County subdivision regulations. Soils in the area are not suitable for septic tank operation but installation is occurring in lieu of sewage systems (3).

B. Ownership

1. Corps

The Corps holds fee title to 7,574 acres at the project. Flowage easements are held by the Corps between the spillway and Blanchard. Acquired from private land holders, these 417 acres abut project operation lands extending from U. S. 220 to Bald Eagle Creek.

2. State

The Commonwealth of PA owns the right-of-way for I 80 at the southwesternmost boundary of the project near Milesburg.

3. County and Municipal

The Boroughs of Howard and Blanchard own lands within their respective corporate limits, but these holdings are limited primarily to administration and public works maintenance. Centre County does not own land in the vicinity of the reservoir.

4. Private

Lands owned by the private sector lie contiguous to Corps property. Change in ownership is most dynamic in the vicinity of the I 80 - U. S. 220 interchange where developers are purchasing large tracts to subdivide for second and retirement home construction (3).

C. Resource Management

1. Recreation

a. Pennsylvania Bureau of State Parks (PBSP)

The Corps outgrants 4,170 acres of land and 1,730 acres of the recreation pool to the PBSP for public park and recreational use on a 40-year lease basis. Bald Eagle State Park on the northwestern shore next to U. S. 220 and the Bald Eagle Mountain Recreation Area on the southeastern shore beyond the Penn Central Railroad are included in the lease (Table D.7.2).

Table D.7.2. Outgrants for Fish and Wildlife and Recreation -- Public Parks, Foster Joseph Sayers Dam and Reservoir.^a

Grantee	Instrument	Rental		Annual Rent Paid (\$)	Acreage	Investment	
		Date	Term (Yrs)			To 1974 (\$)	Planned (\$)
Comm. of Pennsylvania, Game Commission	Lease	1973	25	0	1,030.0	N/A ^b	N/A ^c
Comm. of Pennsylvania, Bureau of Parks	Lease	1973	40	0	5,900.0 ^d	44,037	675,100
Comm. of Pennsylvania, Historical and Museum Commission	Lease	1972	25	0	149.4	250,000	750,000
Borough of Howard	Lease	1972	25	0	40.5	N/A	N/A
Borough of Howard	Lease	1969	25	0	5	N/A	N/A
Comm. of Pennsylvania, Game Commission	Lease ^e	1969	25	0	3.7	N/A	N/A
Totals	6			0	7,128.6	294,037	1,425,100

^a Personal communication, August-December 1974. Baltimore District, Real Estate Division, Management and Disposal Branch, Baltimore, Maryland.

^b Not available.

^c The Pennsylvania Game Commission plans to lease 1,485 acres on the southeastern side of the lake and a substantial amount of land to the north of U.S. 220; acreage to be determined in the future depending upon financial constraints according to its interim wildlife management plans for 1974.

^d Includes 1,730 acres of the recreation pool.

^e The Pennsylvania Game Commission leases this tract to provide water for its nursery between the northwestern lakeshore and U.S. 220.

Prior to impoundment in 1969, the Corps constructed a water system consisting of 2 supply wells with pumps, a pumphouse and chlorinator, and water lines to serve the area now designated as Bald Eagle State Park. A sewage treatment plant was also constructed by the Corps just below the earth works of the dam. This plant receives sewage from the park and the Borough of Howard via a system of mains, laterals, and three forced sewage pump stations. The PBSP operates both systems and the sewage treatment plant. Howard pays the PBSP \$5,000 per year for sewer service. The Borough of Blanchard plans to use the treatment plant in the near future. The Corps project office and maintenance shop and 2 damtender residences are not tied to the sewer system although a main passes within 200 ft of the complex. These buildings are served by 2 septic tanks (4). The treatment plant is capable of handling 10 times the amount of sewage being processed at the present time.

By 1971 the Corps completed construction on restrooms, overlooks, and parking lots in the state park area. Some of the facilities have been neglected; the overlooks and parking lots were overgrown in weeds. Elsewhere along the northwestern shore, the Corps has constructed six boat launching ramps, a small boat landing, a fishing pier, and five vault latrines. The facilities are maintained by the PBSP.

The PBSP leased lands at the project beginning in August 1973. A point of contention raised with the Corps at that time was the requirement that lessees shall administer and maintain premises in accordance with the project master plan. Since the plan had not been completed, the standard wording "U. S. Army Engineers Master Plan" was removed from the lease instrument at the request of the PBSP. Plan review by various interested state and local agencies took place in the Fall of 1974. Publication of the master plan is pending agency review (5).

The PBSP began construction of facilities at Bald Eagle State Park in 1974. Construction consists of a 428-slip floating marina complex and a headquarters building. To be run by a concessioner, the marina will include services such as boat rentals, minor equipment repair, and the sale of gasoline and oil. Slip rental will be handled directly by the PBSP. Fees will run from about \$3.25 to \$3.75 per ft per season based on size (6). Staff members of the Centre County Planning Commission (CCPC) expressed concern about the construction of the marina. They stated that the lake was already crowded on holiday and other weekends and that adding the 428-slip facility would worsen the situation (3). The headquarters building will consist of a small auditorium, rest rooms, a display area, and a refreshment concession (6). State expenditures on these facilities are scheduled to be \$1,271,105 (7).

Further developments planned by the PBSP for the state park include a beach and bath house. These will be the first swimming facilities on the lake. At the present time the Corps does not allow swimming anywhere at Sayers Lake, although water skiing is permitted (2, 6).

The PBSP has taken attendance at Bald Eagle State Park since March 1974. By the end of July attendance totaled 160,936 (6).

The Bald Eagle Mountain Recreation Area is a carefully planned campground (tents only) located on the southeastern side of the lake. There are 36 campsites equipped with fireplaces, picnic tables, and drained tent pads. A \$2 per day fee is charged for camping. The PBSP has begun to make improvements for more camping in the northeastern section of this area with the help of the U. S. Job Corps. Trails for hiking in the summer and for snowmobile riding in the winter are being blazed in this area also (6, 7).

Access to the lake from the primitive recreation area is hampered by the Penn Central Railroad right-of-way. Two pedestrian tunnels were built under the track bed during railroad relocation prior to impoundment to provide access to the lake but no docking facilities were constructed.

b. Pennsylvania Historical and Museum Commission (PHMC)

The Corps leases 149 acres to the PHMC for public park and recreational purposes for a period of 25 years (Table D.7.2). This acreage is located in the vicinity of the unincorporated village of Curtin in the upper reaches of the reservoir. Historical structures now standing on this area include: (1) the 1830 restored mansion of Governor Curtin, (2) a late 19th century frame Victorian house, (3) the Eagle Iron Works and Furnace Stack constructed in 1847, (4) four partial walls of a grist mill, (5) numerous workers' houses and (6) an overgrown canal basin which was used to transport products in and out of the furnace area. The major obstacle to continuing restoration is the lack of state funds. To date an expenditure of \$250,000 has been made toward a planned \$1 million restoration program. Further monies do not appear to be forthcoming (8).

c. Borough of Howard

The Corps leases 2 parcels of 41 and 5 acres for a period of 25 years to the Borough of Howard for public park and recreational use (Table D.7.2). At the larger site located on the southwestern edge of the community, the Corps constructed a comfort station, bath house, and two parking lots for 40 and 46 cars. Included in the borough's plan for this site is a beach with a 300 ft frontage and picnic facilities. The 5-acre site (Howard Central Park) is located along the levee near the center of the community. This facility is being developed with matching funds from the Pennsylvania Department of Community Affairs (9).

The borough maintains a footpath along the top of the levee to connect the two parks. Recently, however, there has been a problem with motorcyclists riding along the levee endangering those who use the footpath as well as creating minor erosion problems (2).

The lake is situated in an area where there is no heavy concentration of population. Alvin Bush, George Stevenson, and Curwensville Dams have been serving the water recreational needs of the general area. Raystown Lake is nearing completion. This Corps project lies within the Harrisburg, Altoona, and Johnstown metropolitan areas. All these reservoirs lie within a 30-45 mi radius from Sayers. A number of state parks and forests lie within this area also.

Although the Sayers project became operational in August 1969, the master plan had yet to be adopted in the Fall of 1974. It is now being reviewed by interested agencies at the federal, state, and local levels. The Corps' Planning Division staff is unable to meet its responsibilities within set time frames because of shortages in manpower and because of other assignments. Corps policy requires that there will be no leasing of lands unless it is done in accordance with the master plan (4). This policy has been waived for the Sayers project by Office, Chief of Engineers (OCE) (5, 9).

The Corps requires yearly reports from outgrantees which include updated project plans. The only substantive plans received have been from the PHMC. Other plans have been in the form of two to three page letters and memoranda (5).

2. Lake Resources

The waters of Sayers Lake are alkaline stemming from the limestone deposits of the mountain range to the southeast. Waters released into Bald Eagle Creek downstream moderate the acidity of waters from tributaries coming from the mountains to the northwest where there are extensive coal mining operations.

The fish population is dominated by carp, brown bullheads, bluegills, and pumpkinseeds. Failure in establishing a good population in game fish has been attributed to erratic fluctuation of water levels. Game fish stocked in the reservoir have been found in significant numbers below the dam. These fish were washed into Bald Eagle Creek during drawdowns. There has been little success in building the game fish population in the reservoir (1). The Pennsylvania Fish Commission (PFC) stocked large-mouth bass in 1971, but because of the lack of success in this effort, a concerted 3-year program was begun in 1974 to develop a self-sustaining fishery. Northern pike, walleye, and tiger muskellunge will be stocked also. It is hoped that the carp problem will subside as game fish become more abundant and established (1, 11).

3. Wildlife

The Corps leases 1,030 acres or 12.9% of all project lands to the Pennsylvania Game Commission (PGC) for wildlife enhancement for a term of 25 years which began in 1973 (Table D.7.2). The PGC has divided its outgrant into 4 management areas. Three of the areas are predominantly open fields with interspersed strips of timber. About 200 acres will be cultivated through a sharecrop arrangement with local farmers allowing for wildlife feeding areas. The fourth area is in forest cover and will be managed as a forest game area; management will include release cuttings and thinnings.

The Corps leases an additional 4 acres to the PGC to provide water for its tree and shrub nursery located in the vicinity of Corps property between U. S. 220 and the northwestern shoreline in the upper reaches of the project. The PGC works in coordination with the PBSP in determining which areas of Bald Eagle State Park might be opened to hunting and in planting nursery stock of game food species in the park. State game laws are enforced by the PGC in the entire Sayers project area (1, 5, 12, 13).

The PGC is considering leasing 1,485 acres on the southeast side of the project for management. This fifth area would be managed for forest game with a series of trails off the main trail of the Bald Eagle Mountain Recreation Area. Management of this area is contingent upon income from sharecropping practices in areas 1, 2, and 3. Habitat development will be limited by financial constraints (12).

The PGC is also interested in the possibility of managing the large tract of land to the northwest of U. S. 220. Such management would be contingent upon financial constraints and planning for wildlife management is incomplete. The PGC submitted to the Corps a two-page letter dated 16 January 1974 generally indicating its intentions; a comprehensive plan was to follow in February. The plan was not received by fall 1974.

4. Other Land Uses

Until 1969, the Bald Eagle Creek valley now flooded by the pool was used for agricultural, residential, and transportation purposes. A single track of the Penn Central Railroad and U. S. 220 ran along the flood plain. About 10 mi of the railroad and 9 mi of the highway were relocated prior to impoundment. A new road and causeway were constructed to provide access to Howard from the newly located U. S. 220 (3).

Before impoundment the communities of Curtin, Howard, and Blanchard used Bald Eagle Creek for power, water supply, sewage disposal, and transportation purposes. All three communities have been affected by the construction of Sayers Reservoir. Curtin was deprived of its access to U. S. 220 from the east; the Howard townscape was changed through the construction of a high levee; and Blanchard has been bounded to its southeast and southwest by Corps flowage easements limiting growth in these directions. Except for these three towns, population and housing were dispersed in an uneven pattern of small farms generally on the valley floor (8).

Remnants of historical land use are apparent today. The shoreline configuration, particularly at the lake's midsection, reflects former highway and railroad rights-of-way and beds. These jut out into the main pool in several places and now serve as access roads and launching ramps. Some of these are being incorporated into the system being developed at Bald Eagle State Park.

In the valley there were three cemeteries (with a total of 1,000 graves) and facilities for two telephone companies (25 mi of line) and a power company (23 mi of line) that had to be relocated. Originally the Corps wished to relocate completely the Borough of Howard (1970 population: 470) but instead, because of local opposition, a rolled earth levee was constructed around the north side of the town to protect it from high waters. The protective works extend for 6,700 ft with a crown height of 667 ft msl, 10 ft above spillway crest (Figure D.7.1) (1, 4).

The Corps leases 178 acres to 9 former owners and tenants in the valley on a year-to-year basis for agricultural purposes. The leases range from less than 1 acre to 66 acres (Table D.7.3). This leasing practice will be followed until the master plan is approved (4). Subject to the compatibility of the existing leases with the approved uses of the master plan, each tract may be leased to former users for one 5-year term. After this initial term, the tracts will be advertised for lease on a competitive bid basis (4). Lands outgranted for agricultural purposes lie generally in the valley floor to the west of Curtin in the upper reaches of the project extending to I 80.

The Corps retains 494 acres for project operations at the damsite (Table D.7.2). These lands include the dam and control tower, an overlook, a sewage treatment plant, two residences, the office and shop, and the spillway. In addition the Corps maintains the 6,700 ft levee at Howard.

Table D.7.3. Outgrants for Agriculture, Rights-of-Way, and Miscellaneous Purposes, Foster Joseph Sayers Dam and Reservoir.^a

Purpose	Grantee	Outgrants	Instrument	Rental		Annual Rent Paid (\$)	Acreage	Investment	
				Date	Term (yrs)			To 1974 (\$)	Planned (\$)
Agriculture ^b	Summary	9	Lease	1974 ^c	1	1,726	217.6	N/A ^d	N/A
Rights-of-Way	Summary	6	Easement	----	40	2,315 ^e	1.4	N/A	N/A
Miscellaneous	Summary	2	Lease ^f	----	5 to indefinite	0	3.6	N/A	N/A
Totals		17				1,726	222.6		

^aPersonal communication, August-December 1974. Baltimore District, Real Estate Division, Management and Disposal Branch, Baltimore, Maryland.

^bAgricultural leases will be let to original owners or tenants until the master plan is approved. Five years thereafter lands will be leased by bid on a 5-year basis.

^cOriginally leases were effective in 1969.

^dNot available.

^ePlat fee for term; not included in total.

^fIncludes one consent instrument permitting use of and passage across an easement.

In total, the Corps leases 7,351 acres or 97% of its lands held in fee simple at Foster Joseph Sayers Dam and Reservoir to other entities for management. The largest segment (7,128 acres) is leased to recreation and wildlife interests of the Commonwealth and the Borough of Howard (Table D.7.4).

5. Resource Use Controls

The PFC is responsible for patrolling Sayers Lake. In addition to enforcing PA fishing laws, the PFC administers boating safety regulations. The number of boating violations and arrests has been high. Most violations are related to speeding and breaking "no wake" regulations (11).

A very large segment, more than half the length of the project, falls in the "no wake" category. All waters to the southwest of the Howard causeway and bridge are restricted to this classification. There are two boat launching ramps in this section of the lake. The "no wake" area was designated by the Corps to establish protected fishing areas. The PFC believes that the "no wake" area is too large since it is inconvenient to travel at very low speeds for 2-3 mi to reach "open" waters. The PFC states that it was not given an opportunity to participate fully in planning for "no wake" areas at Sayers (2, 11).

According to the CCPC staff, "an incredible feature" of the Sayers Lake is that 428 boat slips are being constructed at Bald Eagle State Park. The normal lake is no more than 1 mi wide. The CCPC states that there already are a large number of boats on the lake and that hazardous conditions are evident. On Memorial Day, Fourth of July, and Labor Day weekends the lake surface is crowded. Congestion will be pronounced upon the full operation of the marina (3). Upon completion of the Raystown Lake approximately 45 mi to the southwest near large metropolitan areas such as Harrisburg, York, Altoona, and Johnston, use pressures at Sayers Lake should subside (3). Other agencies did not comment about crowded boating conditions.

Table D.7.4. Summary of Outgrants, Foster Joseph Sayers Dam and Reservoir.

Purpose	Number	Annual Rent (\$)	Acreage	Investment to 1974 (\$)
Fish and Wildlife and Recreation -- Public Parks	6	0	7,128.6	294,134
Agriculture, Rights-of-Way, and Miscellaneous Purposes	17	1,726	222.7	N/A ^a
Totals	23	1,726	7,351.3 ^b	294,134

^a Not available.

^b Acreage outgranted exceeds Manageable Resource Lands because of the inclusion of water surface in the outgrant to the Pennsylvania Bureau of Parks.

Another point raised by the CCPC is the lack of boat motor size limitations. The PFC designates horsepower limitations on lakes throughout the state but none have been imposed at Sayers. There is a need for size limitations because of the narrow lake width and impending heavy use (3).

The CCPC says it was not consulted about many issues concerning Sayers including: resource use, lake impact, land-use demand, population change, and resultant development in general. The CCPC desires to establish a closer working relationship with the Corps and state agencies at Sayers Lake (3).

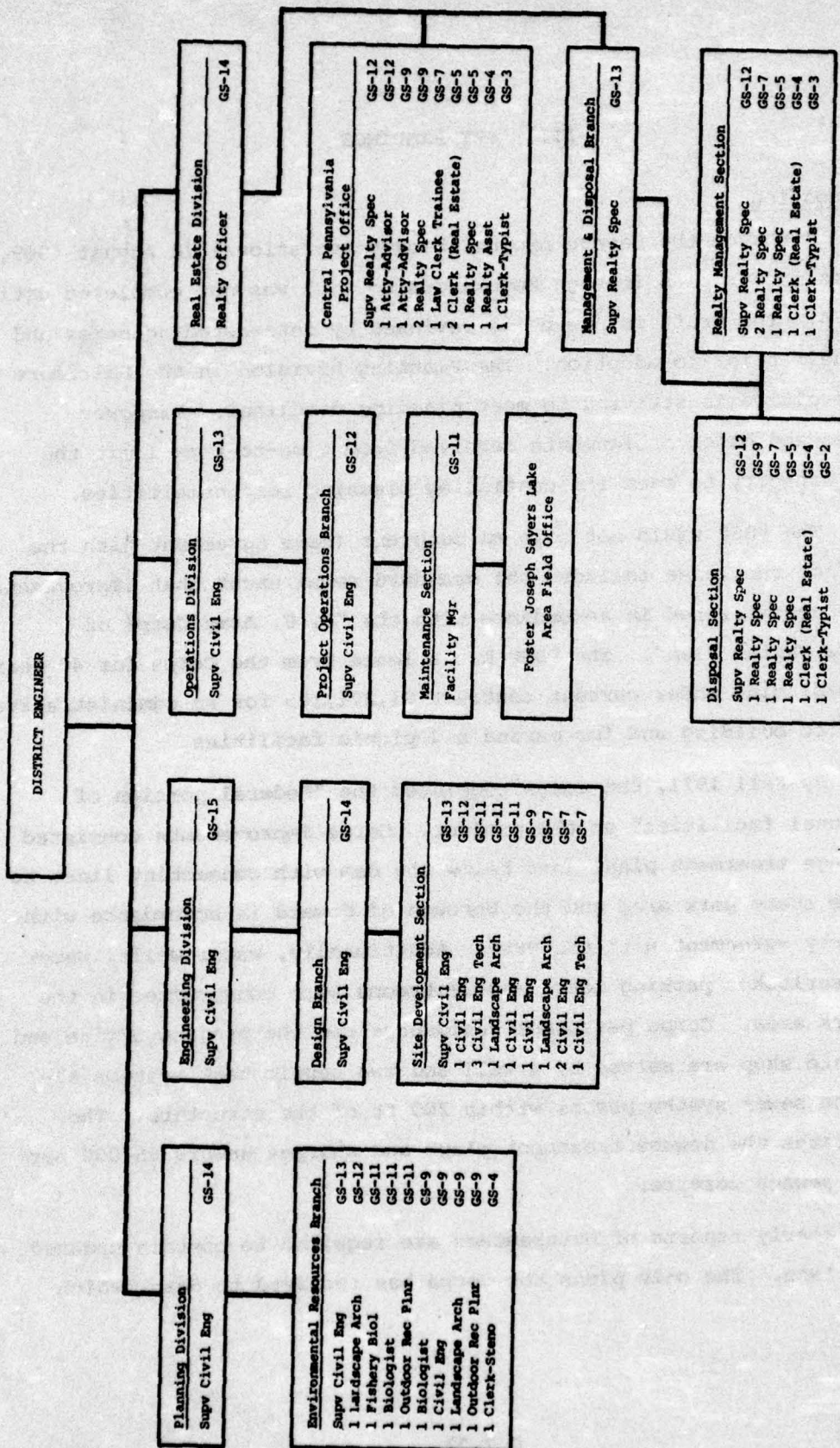
Local zoning control is limited to the corporate jurisdiction of the Borough of Howard. Subdivision regulation is enforced by Liberty Township which includes the damsite and areas surrounding the Borough of Blanchard. Centre County administers subdivision regulations in Howard and Boggs Townships (3).

Blanchard is in the process of building sewers to the Corps treatment plant (operated by the PBSP) at the foot of the dam. Sewer lines serve as the harbingers of development. Development along old U. S. 220 running from the damsite to Blanchard may be brought about by this utility extension where lands are not held in flood easement by the Corps (6, 8).

The best protection available against incompatible land use in areas contiguous to the Sayers project at the present time is the substantial depth of property held by the Corps beyond the reservoir shores. The buffer formed by these holdings may serve to protect lake resources from incompatible development in lieu of adequate local land use planning and control. The Corps holds fee simple title to all lands surrounding the lake extending up to 0.25 mi beyond U. S. 220 and nearly 1 mi beyond the Penn Central Railroad at the main pool.

Project staff at Sayers Lake consists of a damtender, an assistant, a secretary/clerk, and temporary help. Based upon the number of the many different state agencies and local units of government with operational interests at Sayers Lake, an apparent need for the Corps to establish a resource management capability at the project has arisen. The damtender attempts to meet this need but because of other assigned responsibilities and the lack of background in project management he is unable to perform this task adequately (2, 5, 13) (Figure D.7.2).

Figure D.7.2. Recreation-Resource Management Interrelationships - Baltimore Engineer District.



III. KEY FINDINGS

A. Recreation

1. Although the Sayers project became operational in August 1969, the draft master plan (Design Memorandum No. 3C) was not completed until Fall 1974. The draft is now being reviewed by interested agencies and individuals prior to adoption. The Planning Division in the Baltimore District office is striving to meet planning deadlines. Manpower shortages and other assignments received from time-to-time limit the staff's capacity to meet its continuing planning responsibilities.

2. The PBSP would not sign an outgrant lease agreement with the Corps since the lease included the standard requirement that improvements would be accomplished in accordance with the "U. S. Army Corps of Engineers Master Plan". The PBSP has a lease from the Corps for 40 years and is expending under current contract \$1,271,105 for an administrative and service building and for marina and picnic facilities.

3. By Fall 1971, the Corps completed the "Federal portion of recreational facilities" at the project. Corps improvements consisted of a sewage treatment plant just below the dam with connecting lines to serve the state park area and the Borough of Howard in accordance with a tri-party agreement with the PBSP. Additionally, water wells, water mains, overlooks, parking lots, and restrooms were constructed in the state park area. Corps personnel residences and the project office and maintenance shop are served by a well and two septic tank systems although the sewer system passes within 200 ft of the structure. The PBSP operates the sewage treatment plant and charges Howard \$5,000 per year for sewage service.

4. Yearly reports of outgrantees are required to contain updated project plans. The only plans the Corps has received to date, which

are more substantive than two to three page memoranda, have been filed by the PHMC. These plans call for a \$1 million development; \$250,000 has been spent, but the balance may not be available.

5. The PBSP has begun to construct a 428 boat-slip marina to be operated by a concessioner. The CCPC staff expressed concern that the lake is already over-populated with boaters and that the marina will serve to perpetuate crowding on the lake surface.

6. The two park sites of the Borough of Howard are connected by the Corps maintained levee which is a valuable and integral element of the park system. Excessive motorcycle and trailbike use has broken down the levee crown and disrupted recreation activities. Howard has received assistance from the Pennsylvania Department of Community Affairs to develop Central Park which is leased from the Corps.

B. Fish and Wildlife

1. The Corps has designated several "no wake" areas on the lake, including all surface waters to the southwest of the Howard bridge and causeway. The Regional Supervisor of PFC stated that the extent of this area is unreasonable and inconvenient for boaters.

2. The PFC has had a difficult time in establishing a game fishery at Sayers Lake. The drastic drawdown of 20 ft during the winter months for flood control and water quality purposes conflicts with fish management; large numbers of game fish such as tiger muskellunge and pike have been washed into Bald Eagle Creek. Carp and brown bullheads heavily dominate the fish resource. The PFC has begun a concerted game fish stocking effort to rectify the situation.

3. The PGC is operating under an "interim plan" for wildlife management at Sayers Lake. The PGC's efforts are geared to leasing lands for farming and wildlife feeding, to managing forestland habitats, and to maintaining open, fallow field areas for small game.

C. Corps and Contiguous Land Use

1. Corps management of land is limited to those areas it holds in fee simple at the damsite, to the levee at Howard, and to those areas it holds in flowage easement below the dam and extending to Blanchard.

2. Blanchard is building sewerage to the Corps treatment plant. The community will enter into a three-way joint agreement with the Corps and the PBSP. The new sewer lines may attract development detrimental to the project if land-use controls are not applied by local units of government.

3. The CCPC has assisted the Borough of Howard in preparing a land-use plan and zoning and subdivision regulations since the project went into operation. Liberty Township has adopted subdivision controls, but much of the land bordering Corps property lies in Howard and Boggs Townships where little local control is exercised. Land-use guidance is limited to subdivision regulation administered by the CCPC in Bellefonte.

4. In lieu of adequate local land-use controls, the best assurance that contiguous detrimental development will not severely injure Sayers Lake lies in the broad band of land the Corps owns around the water body in most sections. The buffer formed by these holdings may serve to protect lake resources from incompatible land uses. The Corps holds fee simple title to all lands surrounding the lake extending up to 0.25 mi beyond U. S. 220 and nearly 1 mi beyond the Penn Central Railroad at the main pool.

D. Corps Organization

1. No Corps recreation or resource management expertise exists at Sayers Lake. A damtender, an assistant, a clerk/typist, and part-time and temporary maintenance help make up the project staff. Outgrantees at the lake must deal directly with district offices in Baltimore. The

damtender attempts to meet communication and information needs of resource managers at the lakes, however these attempts have been inadequate because of other assignments and a lack of background in management.

2. It is apparent that the Corps is not master of its own project operations at Sayers Reservoir. Each outgrantee has developed plans for use of leased lands according to projected needs derived from its own perspective. This has been done outside the context of an overall, comprehensive schematic for planning and management at the project. The master plan is nearing approval and the draft is a good working document. It should serve well as a guiding instrument in existing and future operations if a Corps-sponsored, central, coordinative function is established at Sayers Dam and Reservoir.

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11. Personal communication, 15 August 1974. Pennsylvania Fish Commission, Regional Supervisors Office, Lock Haven, Pennsylvania.

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8. CHESAPEAKE AND DELAWARE CANAL

North Atlantic Division

Philadelphia District

Delaware and Maryland

I. SETTING

A. Location

The Chesapeake and Delaware (C&D) Canal connects Delaware Bay and the Chesapeake Bay through a land cut approximately 17 miles (mi) long (1). The land cut starts at Reedy Point in New Castle County, Delaware, and extends westward to Welch Point in Cecil County, Maryland (Figure D.8.1). Road access is provided by U. S. 301, U. S. 13, DE 9, and MD 213. The Towns of Delaware City, DE, St. Georges, DE, and Chesapeake City, MD are located along the canal; Baltimore and Annapolis, MD, Wilmington, Newark and Dover, DE, Philadelphia and Chester, Pennsylvania, and Camden, New Jersey lie within about 50 mi of the project.

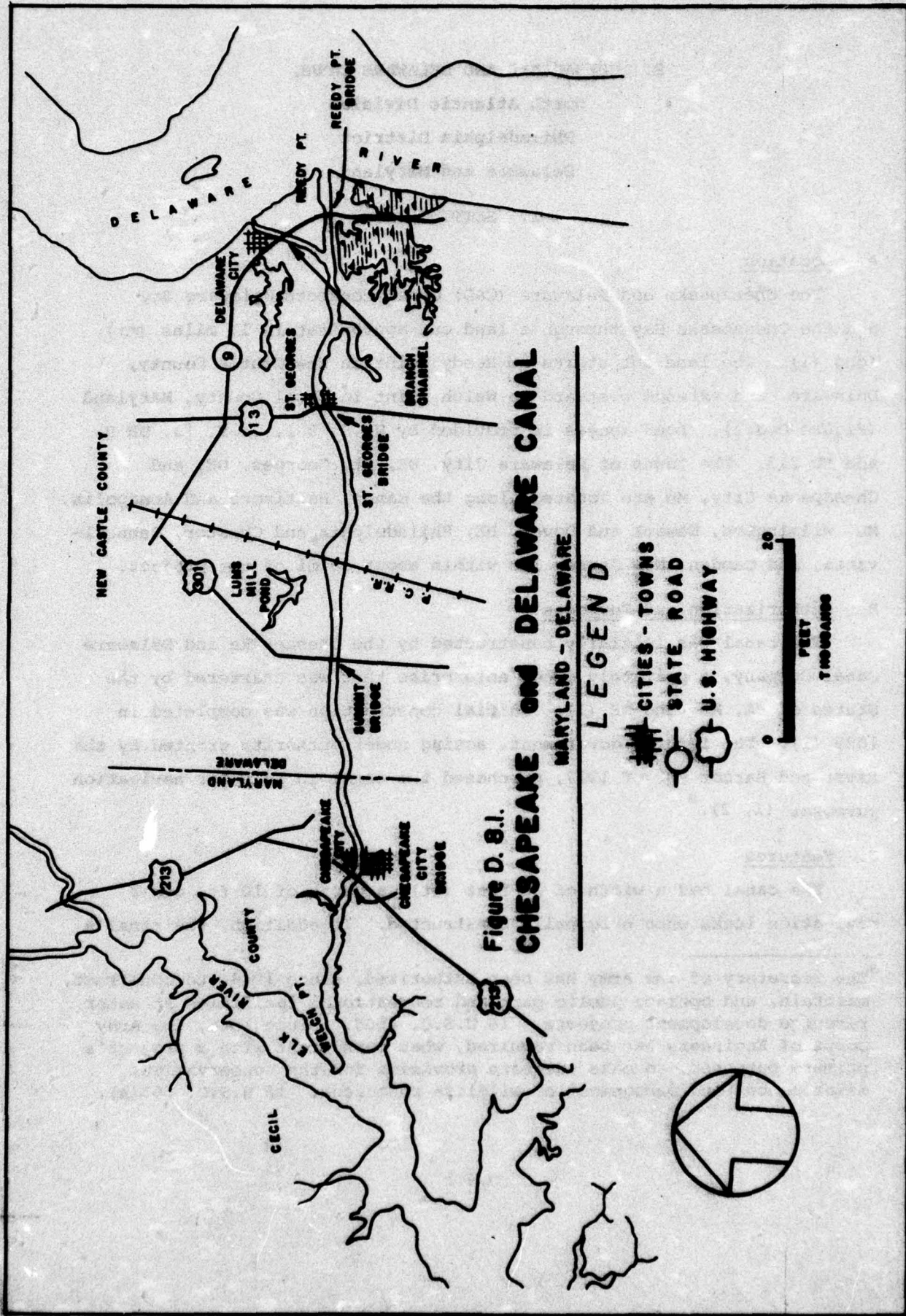
B. Authorization and Purposes

The canal was initially constructed by the Chesapeake and Delaware Canal Company, a privately owned enterprise that was chartered by the States of PA, MD, and DE (1). Initial construction was completed in 1829 (1). The federal government, acting under authority granted by the River and Harbor Act of 1917, purchased the canal in 1919 for navigation purposes (1, 2).^a

C. Features

The canal had a width of 36 feet (ft), a depth of 10 ft, and 3 navigation locks when originally constructed. In addition, the canal's

^aThe Secretary of the Army has been authorized, since 1944, to construct, maintain, and operate public park and recreational facilities at water resource development projects. 16 U.S.C. 460d. Since 1946, the Army Corps of Engineers has been required, when consistent with a project's primary purposes, to make adequate provision for the conservation, maintenance, and management of wildlife resources. 16 U.S.C. 663(a).



eastern terminus was originally at Delaware City. The project was converted to a sea-level canal subsequent to federal ownership. Canal widths and depths were increased to 90 ft and 12 ft respectively by 1929 and to 250 ft and 27 ft respectively by 1938. During modification, the canal's eastern course was altered to provide easier entrance from the Delaware River. Rerouting shifted the eastern terminus to Reedy Point but a branch channel to Delaware City was retained. Acting under authority granted by the River and Harbor Act of 1954, canal width and depth dimensions are now being increased to 450 ft and 35 ft respectively. Modification is 90% complete (1). The C&D Canal is also subject to annual maintenance dredging. All dredged material is deposited on Corps lands contiguous to the canal. Both sides of the canal have been rip-rapped.

Five bridges traverse the canal; four are highway bridges which, from east to west, cross at Reedy Point, St. Georges, Summit, and Chesapeake City. The fifth is a railroad bridge that crosses the canal halfway between the St. Georges and Summit Bridges. All five bridges are owned and maintained by the Corps (1).

The project has a drainage area of only 65 square mi; runoff from this area has no appreciable influence on the hydraulics of the canal. Tides in the canal are semidiurnal, occurring about 2.5 hours earlier in the Welch Point area than in the Reedy Point vicinity. Mean tidal ranges are 2.6 ft near the western end of the canal and 5.5 ft near its eastern terminus. Currents flow eastward during flood tides and westward during ebb tides. Maximum salinities are generally less than ten parts per thousand (1).

The canal is located within the Atlantic Coastal Plain physiographic province. Topography of the area is relatively flat and featureless. Elevations range from less than 10 ft mean sea level (msl) in low-lying areas to 90 ft msl on upland sites. Lowland biotic communities on

project lands are located primarily at the eastern and western ends of the canal; upland habitats are located in between. Vegetational establishment and composition on project lands is influenced by land-use practices. Lands not used as a dredged material disposal sites are frequently inhabited by willows, narrow-leaf cattails, rushes, common reed, smartweeds, pondweeds, and duckweeds in low marshland areas, and by pines and mixed deciduous hardwoods having understories of laurel, greenbrier, and Japanese honeysuckle on upland situations. Lands frequently or recently used as disposal areas are usually devoid of vegetation except for grasses seeded on dikes for erosion prevention. Lands intermittantly or no longer used for dredged material disposal are often inhabited by dense, monospecific stands of common reed in lowland regions, and by Virginia pine, black locust, oaks, witch hazel, sumac, and scotch broom on upland areas (1, 3).

Approximately 500 acres of disposal area on both banks of the canal, from Summit Bridge to the DE-MD state boundary, is unable to sustain vegetative cover despite repeated fertilizing and planting efforts by the Corps. Failure of the area to support vegetation has resulted from the deposition of highly acidic solids (pH 2.8 to 4.3) containing marcosite deposits. The soils were dredged from Magothy and Potomac lithologic formations in the canal (1).

Other project features are shown in Table D.8.1.

Table D.8.1. Resource Statistics, Chesapeake and Delaware Canal.

Date of Authorization	1917 ^a
Rights in Land Acquired Between	1919 - present ^{b,c,d}
Date of Full Operation	1919 ^b
Canal Water Surface	764 acres ^e
Water Fluctuation-Summer Recreation Season	3.5 feet ^f
Shoreline at Normal Pool	27 miles ^e
Held in Fee Simple by Corps	26 miles ^e
Land Area Managed by Corps	
Total Land in Project	15,293 acres ^{a,g}
Fee Title in U. S.	15,210 acres ^{a,g}
Easements to Flood	83 acres ^a
Project Operations Lands	7,774 acres ^e
Manageable Resource Lands	7,519 acres ^{g,h}

^aPersonal communication, December 1974-January 1975. Philadelphia District, Engineering Division, Design Branch, Recreation and Relocation Section, Philadelphia, Pennsylvania.

^bCanal was originally constructed by a company chartered by the states of Pennsylvania, Maryland, and Delaware. The original canal was completed in 1829; the Corps assumed operation in 1919.

^cPersonal communication, December 1974. Philadelphia District, Real Estate Division, Management and Disposal Branch, Philadelphia, Pennsylvania.

^dLands for dredge material disposal are acquired as needed.

^eRRMS. 1973.

^fU. S. Dept. of Commerce, National Oceanic and Atmospheric Administration, 1974. Tide tables: east coast of North America, Washington, D. C.

^gIncludes 1,400 acres disjunct from Corps lands contiguous to the canal.

^hTotal Land in Project minus (Easements + Project Operation Lands).

II. LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

A. Analytical Unit

Three geographic zones are influenced by the canal's presence: lands near or contiguous to the project, the area from which reservoir visitors are drawn, and the maritime area affected by the project.

Although lands in the project vicinity have remained in a rural setting, three towns and six private marinas have been established in response to the canal's presence. The towns from east to west are: Delaware City, DE (population 2024), St. Georges, DE (population 339), and Chesapeake City, MD (population 1031). In addition to town and marina development, four heavy industries have located in the canal vicinity: American Hoechst Corporation Film Division, Getty Oil Company, Tyson F. Sartin, Inc., and St. Georges Canning Company. The Getty Oil Company refinery at Delaware City is the largest of the four industries (1).

No structured studies have been conducted to determine the canal's market area. However, district personnel indicated that the majority of canal visitors originate from the Wilmington-Newark, DE vicinity with the remainder coming from local communities and other nearby metropolitan regions (2). Wilmington and Newark populations in 1960 and 1970 and are noted in Table D.8.2.

The canal is an integral part of the Atlantic Intracoastal Waterway. The land cut provides a 10-hour time savings for the average vessel traveling from Baltimore to New York and other more northern ports. Principle shipping points for canal traffic include Trenton and Camden, NJ, Philadelphia and Chester, PA, Wilmington, DE, Annapolis and Baltimore, MD, and Washington, D. C. (1).

Table D.8.2. Populations of Selected Counties and Municipalities in the Chesapeake and Delaware Canal's Recreation Market Area.

County/Municipality	Population		Percent Change
	1960	1970	
New Castle County, DE ^a	307,446	385,856	25.5
Cecil County, MD ^b	48,408	53,291	10.1
Wilmington, DE ^a	95,827	80,386	-16.1
Newark, DE ^a	11,404	20,757	45.0

^aU. S. Bureau of the Census. 1971. U. S. census of population: 1970; number of inhabitants: Delaware. Washington, D. C.

^bU. S. Bureau of the Census. 1971. U. S. census: 1970; number of inhabitants: Maryland. Washington, D. C.

B. Ownership

1. Corps

The Corps has acquired fee title or flowage easements to all lands contiguous to the canal. Project boundaries have been monumented but are in need of remonumentation because numerous markers have been covered or vandalized (4).

2. Other Public Ownership

DE owns 904 acres contiguous to Corps property; 901.7 acres were formerly owned by the Corps but were declared surplus and conveyed to DE in two parcels in 1951 and 1966 for establishment of a state park (5).

C. Resource Management

1. Recreation

a. Corps

A recent environmental impact statement indicates that recreation is incidental to the main purpose of the C&D Canal and is expected to account for only 2% of the benefits derived from the project's operation over the next 100 years (1).

The Corps presently operates and maintains 13 fishing piers, 2 minor picnic areas, and a museum at the C&D Canal (2). The museum contains interpretive archeological and historical displays and a refurbished pumphouse originally built in 1837 and used when the project was a lock-canal (5). The pumphouse is located at Chesapeake City and was certified a National Historical Landmark in 1965 (5).

The Corps has invested \$197,319 of project funds for the fishing piers. Project funds have also been used for development of the old pumphouse historic site but amounts were not readily available (2).

Recreational days of use at the C&D Canal in 1973 was 160,200 (8). RRMS data indicate that sightseeing and fishing are the major visitor interests and account for 60% and 20%, respectively, of canal

activity use (8). Pleasure boating and swimming were not reported as activity uses and are discouraged in the canal for safety reasons (8, 2). Recreational days of use and canal activity use data are determined from estimates made by Corps project-level staff; no mechanical vehicle counters are used nor are direct visitor contact surveys conducted (6, 2). No fees are charged for use of Corps facilities (2).

The Corps plans to construct in the near future four recreation sites encompassing about 421 acres. These sites are: Welch Point, MD, Summit North, DE, Summit South, DE, and Reedy Point, DE. Justification for the additions was based on a NPS evaluation that an unsatisfied annual demand of 16,900,000 recreation days exists within a 50-mi radius of the canal. Development will involve an estimated \$1,095,000 of project funds (landscaping costs not included). Operation and maintenance of the Welch Point, MD site will be delegated to the State of MD by means of a lease; the other three sites will be leased to the State of DE for operation and maintenance. Facilities to be provided are noted in Table D.8.3. Development of the four sites is expected to increase the project's annual visitation rate to about 947,000; annual visitation to the four sites is expected to average 446,100. All four sites were formerly utilized for disposal of dredged material^a (5).

b. Municipal

The Corps has licensed 1.5 acres to Delaware City for operation of a third party marina with docking facilities. The marina is located on a branch channel from the canal. Although the marina is a profit-making enterprise, the outgrant has been classified for public park purposes by the Corps (Table D.8.4) (4).

^a Dredged material disposed on portions of the Summit North and Summit South recreation sites is highly acidic and is unable to sustain vegetative cover (1, 5).

Table D.8.3. Recreation Facilities to be Provided by the Corps at Welch Point (MD), Summit North (DE), Summit South (DE), and Reedy Point (DE) Recreation Sites at the C&D Canal.^a

Facilities	Recreation Sites			
	Welch Point (77 acres)	Summit North (187 acres)	Summit South (130 acres)	Reedy Point (27 acres)
Picnicking	X	X	X	X
Swim Beach	X ^b			
Boat Launching Ramp	X ^b			
Overlook			X	
Parking Lot	X	X	X	X
Access Road(s)	X	X		
Bathhouse	X			
Sewage Disposal System	X			
Comfort Station	X	X	X	
Potable Water	X			

^aPhiladelphia District. 1969. Chesapeake and Delaware Canal, design memorandum no. 28 (master plan, Philadelphia, Pennsylvania).

^bThese will be located on the Elk River which provides access to the Chesapeake Bay.

Table D.8.4. Outgrants for Fish and Wildlife and Recreation -- Public Parks, Chesapeake and Delaware Canal.^a

Grantee	Instrument	Rental		Annual Rent Paid (\$)	Acreage	Investment	
		Date	Term (yrs)			To 1974 (\$)	Planned (\$)
State of Delaware, Bd of Game & Fish	License	1950	25	0	4,708.2	N/A ^b	N/A
State of Maryland	License	1968	25	0	2,400.0	N/A	N/A
City of Delaware City	License	1962	25	0	1.5	N/A	N/A
Totals	2			0	7,109.7		

^a Personal communication, January 1975. Philadelphia District, Real Estate Division, Management and Disposal Branch, Philadelphia, Pennsylvania.

^b Not available.

Table D.8.5. Outgrants for Agriculture, Grazing, Rights-of-Way, and Miscellaneous Purposes, Chesapeake and Delaware Canal.^a

Purpose	Grantee	Outgrants	Instrument	Rental		Annual Rent Paid (\$)	Acreage	Investment	
				Date	Term (yrs)			To 1974 (\$)	Planned (\$)
Agriculture	H. W. Cook Sr.		Lease	1969	31	113	11.3 ^b	N/A ^c	N/A
Agriculture	Earl T. Sheats		Lease	1969	5	150	27.2	N/A	N/A
Grazing	Joseph Lloyd		Lease	1969	5	25	0.9	N/A	N/A
Private Recreation	Littleton Mitchell		Lease	1972	5	50	0.2	N/A	N/A
Rights-of-Way	Summary	31	Easement	----	25 to Indef.	20	34.5	N/A	N/A
Other	Summary	12	Permit	----	5-50	640	4.1	N/A	N/A
Totals		47				916	78.2		

^a Office, Chief of Engineers. 1974. Outgrants-CW-Active (Chesapeake and Delaware Canal). Washington, D. C.

^b Personal communication, January 1975. Philadelphia District, Real Estate Division, Management and Disposal Branch, Philadelphia, Pennsylvania.

^c Not available.

c. Private

The Corps has issued 5-year leases for one private individual boat dock (Table D.8.5), and one private commercial boat dock associated with a restaurant.

d. Other

Lums Pond State Park is located contiguous to the Corps' Summit North Recreation Area and is operated and maintained by the Delaware Division of Parks, Recreation, and Forestry (DDPRF). Most existing facilities at the park have been developed around a 200-acre pond formerly utilized as a water source for C&D Canal lock operations and, later as a settling basin for material dredged from the canal (9). Recreational facilities provided include campsites, a boat launching ramp, picnic sites, a swim beach, interpretive nature trails, and a nature center (9). Visitation in 1974, based on direct counts by the DDPRF, was 257,095 (10). Most visitors to the park utilize day-use facilities and are from the Wilmington-Newark area (10). Park entrance and camping fees are charged (10).

The DDPRF plans to acquire additional land for Lums Pond State Park and increase the quantity and diversity of the park's recreational facilities.^a Development of recreational facilities at the park has a high priority because it serves the state's major metropolitan area (Wilmington). Full recreational development is expected to involve about \$22 million (11).

Other recreation areas in the project vicinity are Brandywine Creek, Brandywine Springs, Fort Delaware State Parks in DE, and Elk Neck State Park in MD.

^aThe DDPRF plans to acquire land from private landowners between U. S. 301, U. S. 71, and County Road 54. Land acquisitions will increase the park size from 904 to 1,750 acres (11). The Summit North recreation area, when leased from the Corps, will also be included as part of the park (10).

2. Canal Resources

Monitoring of canal water quality is performed in conjunction with Corps dredging activities and university research programs. No water quality problems were noted by district personnel except short-term, high turbidities associated with canal dredging operations (12). A recent environmental impact statement indicates, however, that high coliform counts have been recorded in the Delaware River near the canal's eastern terminus and that viable coliforms are occasionally transported through the canal as far as Welch Point via tidal action (1).

The Corps has licensed 5,000 acres of land and water to the Delaware Division of Fish and Wildlife (DDFW) and 2,400 acres of land and water to the Maryland Department of Game and Inland Fish (MDGIF) for management of the project's fish and wildlife resources.^a The Corps, however, retains the right to dispose dredged material on the licensed acreage (5).

No fish enhancement programs have been implemented in the canal or tributary streams. DDFW personnel indicated, however, that construction of the canal has been beneficial from a fisheries standpoint because it provides a migratory route for anadromous species and important spawning habitat for striped bass (13).

3. Wildlife

All lands licensed to the MDGIF and 3,713 acres licensed to the DDFW are utilized for dredged material disposal by the Corps (4, 5, 14). Disposal of dredged material on lands licensed to the DDFW and the MDGIF has created the establishment of several dense, monospecific stands of common reed which is considered a nuisance plant by both state agencies (3, 14).

^aLicensed water acreage includes only tributary creeks or similar water bodies; canal water acreage is not included but fisheries management in the canal is an assumed responsibility of each state.

Management programs implemented by the DDFW are primarily designed to enhance game species that utilize old field biotic communities, such as Ring-necked Pheasants, Bobwhites, Mourning Doves, and cottontail rabbits. No waterfowl enhancement programs have been implemented by the DDFW but Corps dredged material disposal operations have inadvertently created waterfowl habitat in some low-lying areas where dikes have been constructed. Management practices implemented by the DDFW have included planting of wildlife food plots, put-and-take stocking of Ring-necked Pheasants, and control programs for common reed. Population censuses performed by the DDFW at the C&D Canal include Mourning Dove call-counts and aerial surveys of waterfowl. Data on project deer populations are obtained from reported hunter kills. Hunting is permitted on all of the licensed land (13).

The DDFW attempts to minimize land-use conflicts by not implementing habitat manipulation practices (such as planting wildlife food plots) in areas frequently utilized as dredged material disposal areas. Despite the precautions, the Corps occasionally disposes dredged material on areas subject to habitat manipulation thus negating DDFW's management efforts (13).

Lands licensed to the MDGIF include approximately 1,400 acres that are disjunct from Corps lands contiguous to the canal (4). The disjunct acreage was included in the total project acreage noted in Table D.8.1.

Wildlife management at the C&D Canal by the MDGIF has been limited in the past because of lack of manpower, equipment, and conflicting Corps land-uses (14). The MDGIF is currently designing a management program that will be directed towards enhancing "...waterfowl, white-tailed deer, and upland game species" (14).

4. Other Land Uses

a. Dredged Material Disposal

The project master plan indicates that 6,683 fee acres and 19 acres of flowage easement are designated disposal areas for material dredged from the canal (5). In contrast to the project master plan, personnel in the district's Construction-Operations Division noted that all project lands may be utilized for dredged material disposal (15).

Projected annual disposal rates on lands contiguous to the canal were not noted in the project master plan or provided by Corps personnel. However, the master plan states that an estimated 56 million cubic yards of material will be removed from the canal over a 50-year period which began in 1969 (5). Lands utilized for dredged material disposal frequently have a well-defined plateau-like appearance and are not especially appealing for development as recreational areas. Use of lands adjacent to the canal for dredged material disposal also limits development of canal-front recreation sites.

b. Forestry

No forestry practices are performed on the project. The Corps, however, has planted several species of trees, shrubs, and herbaceous plants for erosion prevention and stabilization of several dredged material disposal areas (2, 3).

c. Agriculture and Grazing

The Corps has issued two leases for agriculture and one lease for grazing at the C&D Canal (Table D.8.5). The three leases encompass 39 acres. No problems such as cattle trespass or overgrazing were noted. Corps personnel indicated that the leases could quickly be revoked should any land-use conflicts arise (4).

d. Rights-of-way

The Corps has issued 31 easement for rights-of-way (Table D.8.5). Easement term lengths range from 25 years to indefinite.

A summary of Corps outgrants at the C&D Canal is provided in Table D.8.6.

5. Resource Use Controls

The Engineering and Real Estate Divisions are primarily responsible for recreation resource planning at the district level (Figure D.8.2). However, no recreation specialists are on the district staff because recreation is not considered an important district function (2). District personnel indicated that few of their projects have large-scale recreation programs and that operation and maintenance of recreational facilities is usually delegated to other agencies by means of outgrants (2, 4).

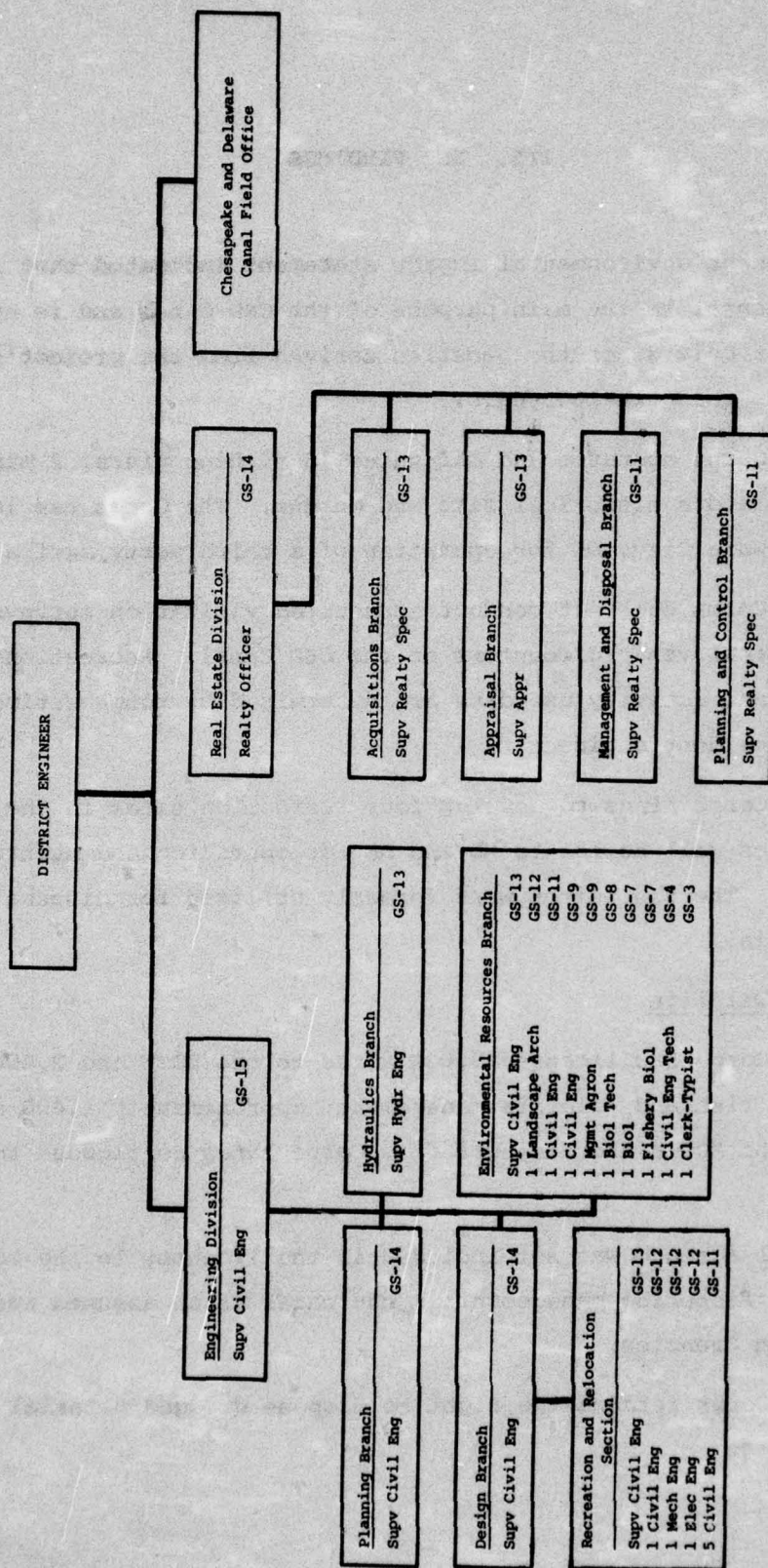
Corps project-level personnel report directly to the district's Executive Office (district engineer). Staffing includes: 1 resident engineer, 5 marine dispatchers, 1 launch operator, 1 secretary, 1 park guide, 1 clerk, and 1 janitor, 40 maintenance personnel, and 5 construction inspectors. Although project-level personnel are primarily associated with the project's navigational aspects, they are responsible for maintenance of existing recreational facilities. The park guide (GS-4) is also responsible for conducting interpretive visitor talks on the history of the old pumphouse (16).

Table D.8.6. Summary of Outgrants, Chesapeake and Delaware Canal.

Purpose	Number	Annual Rent Paid (\$)	Acreage	Investment to 1974 (\$)
Fish and Wildlife and Recreation -- Public Parks	3	0	7,109.7	N/A ^a
Agriculture, Grazing, Rights-of-Way, and Miscellaneous	<u>47</u>	<u>916</u>	<u>78.2</u>	N/A
Totals	50	916	7,187.9	

^a Not available.

Figure D.8.2. Recreation-Resource Interrelationships - Philadelphia Engineer District.



III. KEY FINDINGS

A. Recreation

1. A recent environmental impact statement indicated that recreation is incidental to the main purpose of the C&D Canal and is expected to account for only 2% of the benefits derived from the project's operation over the next 100 years.

2. The Corps operates and maintains 13 fishing piers, 2 minor picnics areas, and a historical site and museum. The Corps has issued a lease to Delaware City, DE for operation of a third party marina.

3. The Corps does not conduct structured visitation surveys or deploy mechanical vehicle counters at the C&D Canal. Recreational days of use and canal activity use data are determined by rough estimates made by the resident engineer.

4. The Corps plans to develop four recreation sites in the near future. Leases will be let to MD and DE for operation and maintenance of the sites. The four sites were formerly utilized for disposal of dredged material.

B. Fish and Wildlife

1. The Corps has licensed 5,000 acres to the DDFW and 2,400 acres to the MDGIF for fish and wildlife management; approximately 1,400 acres licensed to the MDGIF are disjunct from Corps lands contiguous to the canal.

2. Canal acreage was not included in the licenses to the DDFW and the MDGIF but fisheries management in the canal is an assumed responsibility of both agencies.

3. The Corps retains the right to dispose dredged material on the licensed acreage.

4. No fish enhancement programs have been implemented in the canal. DDFW personnel stated, however, that construction of the canal has been beneficial from a fisheries standpoint because it provides a migratory route for anadromous species and important spawning habitat for striped bass.

5. The wildlife management program implemented by the DDFW is designed to enhance upland game species and includes planting of food plots, put-and-take stocking of Ring-necked Pheasants, and control programs for the common reed which has become established in dense monospecific stands at several sites. DDFW personnel indicated that the Corps occasionally disposes dredged material on wildlife food plots and other areas that have been subject to habitat manipulation.

6. No waterfowl enhancement programs have been implemented by the DDFW but Corps dredged material disposal operations have inadvertently created waterfowl habitat in some low-lying areas where dikes have been constructed.

7. Wildlife management by the MDGIF has been limited in the past by a lack of manpower, equipment, and conflicting Corps land-use practices. The MDGIF is presently designing a management plan that will be directed toward enhancing waterfowl and upland game species.

C. Corps and Contiguous Land Use

1. Disposal of dredged material on project lands creates well-defined, plateau-like areas that are not especially desirable for recreational development. Use of lands adjacent to the canal also limits development of canal-front recreation sites.

2. Sediment dredged from Potomac and Magothy lithologic formations is highly acidic and will not support vegetative cover. Approximately 500 acres of project lands including portions of two proposed recreation sites are presently covered with highly acidic sediments.

3. Lands contiguous to the canal have remained in a rural setting. The establishment of 3 small towns, 6 private marinas, and possibly 4 industries are attributable to the canal's construction.

D. Real Estate Programs and Practices

The Corps has issued two leases for agriculture and one lease for grazing at the C&D Canal. The leases can be quickly revoked should any land-use conflicts arise.

E. Corps Organization

1. No recreation specialists are on the district staff because recreation is not considered an important district function (2). District personnel indicated that few of their projects have large-scale recreation programs and maintenance of recreational facilities is usually delegated to other agencies by means of outgrants.

2. The Corps project-level staff consists of 11 employees who report directly to the district's Executive Office (district engineer). Although project-level personnel are primarily associated with the project's navigational functions, they are responsible for maintenance of existing recreation facilities. The park guide (GS-4) is also responsible for interpretive visitors talks on the history of the old pumphouse.

F. Environmental Problems

1. Dredging operations in the canal create high turbidities for short time periods.

2. A recent environmental impact statement noted that high coliform counts have been reported in the Delaware River near the canal's eastern terminus and that viable coliforms are occasionally transported through the canal to as far as Welch Point via tidal action.

IV. REFERENCES

1. Philadelphia District. 1973. Final environmental impact statement: inland waterway, Delaware River to Chesapeake Bay. Philadelphia, Pennsylvania.
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5. Philadelphia District. 1969. Chesapeake and Delaware Canal, design memorandum no. 28 (master plan). Philadelphia, Pennsylvania.
6. Personal communication, January 1975. Philadelphia District, Construction-Operations Division, Philadelphia, Pennsylvania.
7. Personal communication, December 1974. Delaware Division of Parks, Recreation, and Forestry, Dover, Delaware.
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16. Personal communication, December 1974. Field Office, Philadelphia District, Chesapeake and Delaware Canal, Chesapeake City, Maryland.

9. UPPER MISSISSIPPI RIVER, POOL #21

North Central Division

Rock Island District

Illinois and Missouri

I. SETTING

A. Location

Upper Mississippi River Project, Pool #21 (MRP 21) is one of 13 navigation pools situated within the jurisdictional bounds of the Rock Island District. Lock and Dam (L&D) 21 are located at river mile (mi) 324.9 on the southern extremity of the City of Quincy, Illinois (1970 population: 45,288). The pool extends north for 18.3 mi to L&D 20 (river mi 343.2) at Canton, Missouri (1970 population: 2,680). MRP 21 is bounded by Lewis and Marion Counties on the MO shore and by Adams County on the IL side of the river. Another community situated on the MO shore is LaGrange with 1,237 residents (Figure D.9.1).

Public access to the river from the MO shore is limited to the town dock at LaGrange and to two boat launching ramps operated by the Missouri Department of Conservation (MDC) at Canton and LaGrange. Other than at these points, access is very difficult and must be gained either by foot through privately held lands or by water. The Burlington-Northern Railroad, the levee system, and the low-lying farmlands virtually obstruct public access as far south as Hannibal (1).

Access to the east bank is very good via a series of paved roads (U. S. 24 and IL 96), unpaved roads, community and Corps launching ramps, parks, and campgrounds. Obstructions to access on the IL shore are limited to levees primarily and to high waters periodically.

Figure D.9.1.

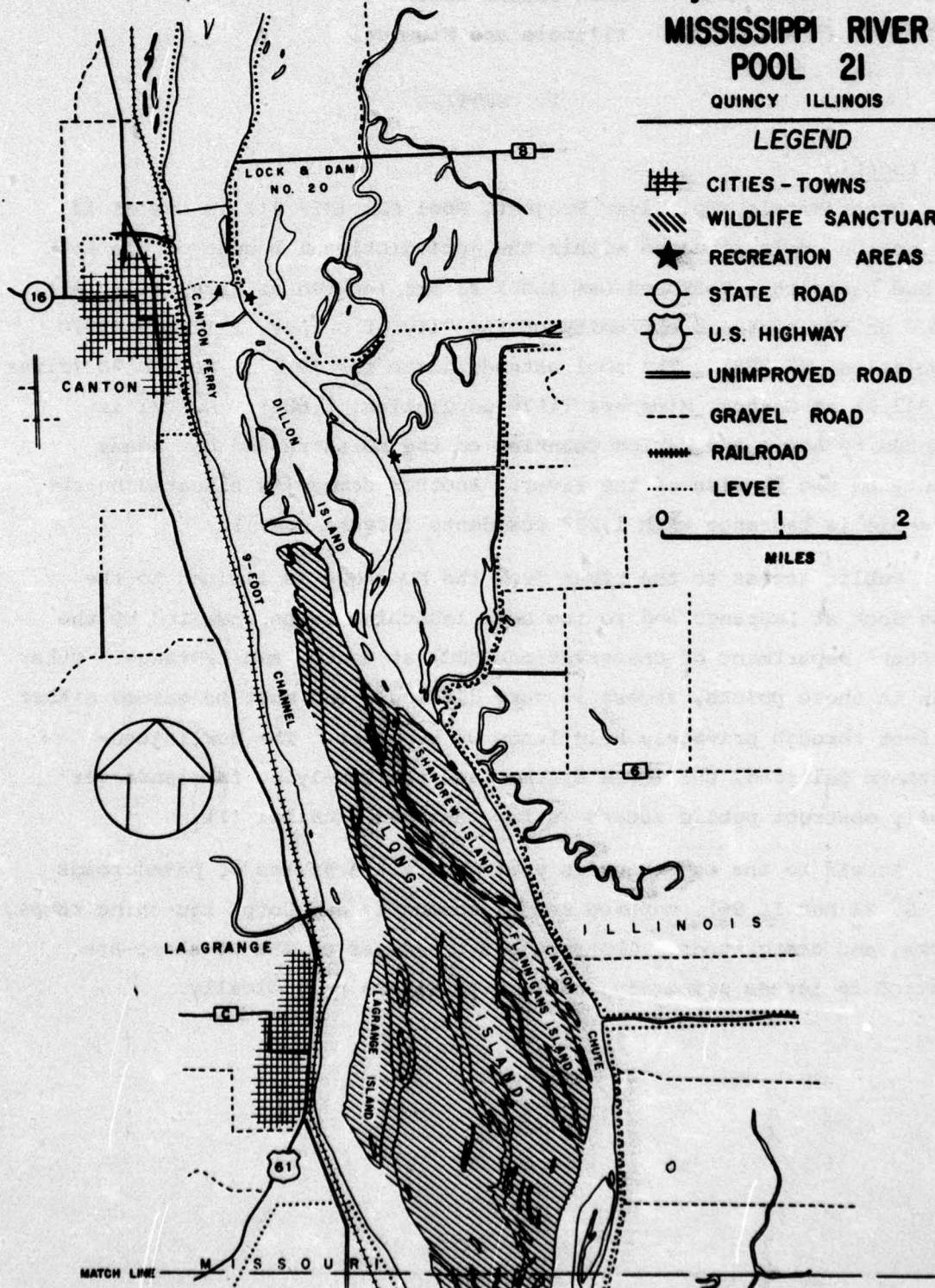
MISSISSIPPI RIVER POOL 21

QUINCY ILLINOIS

LEGEND

-  CITIES - TOWNS
-  WILDLIFE SANCTUARY
-  RECREATION AREAS
-  STATE ROAD
-  U.S. HIGHWAY
-  UNIMPROVED ROAD
-  GRAVEL ROAD
-  RAILROAD
-  LEVEE

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MILES



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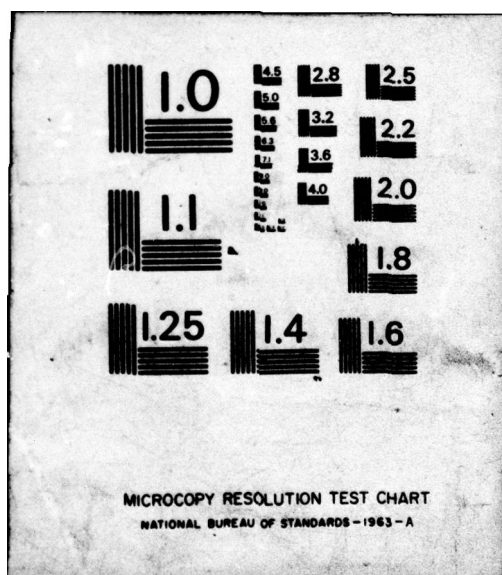
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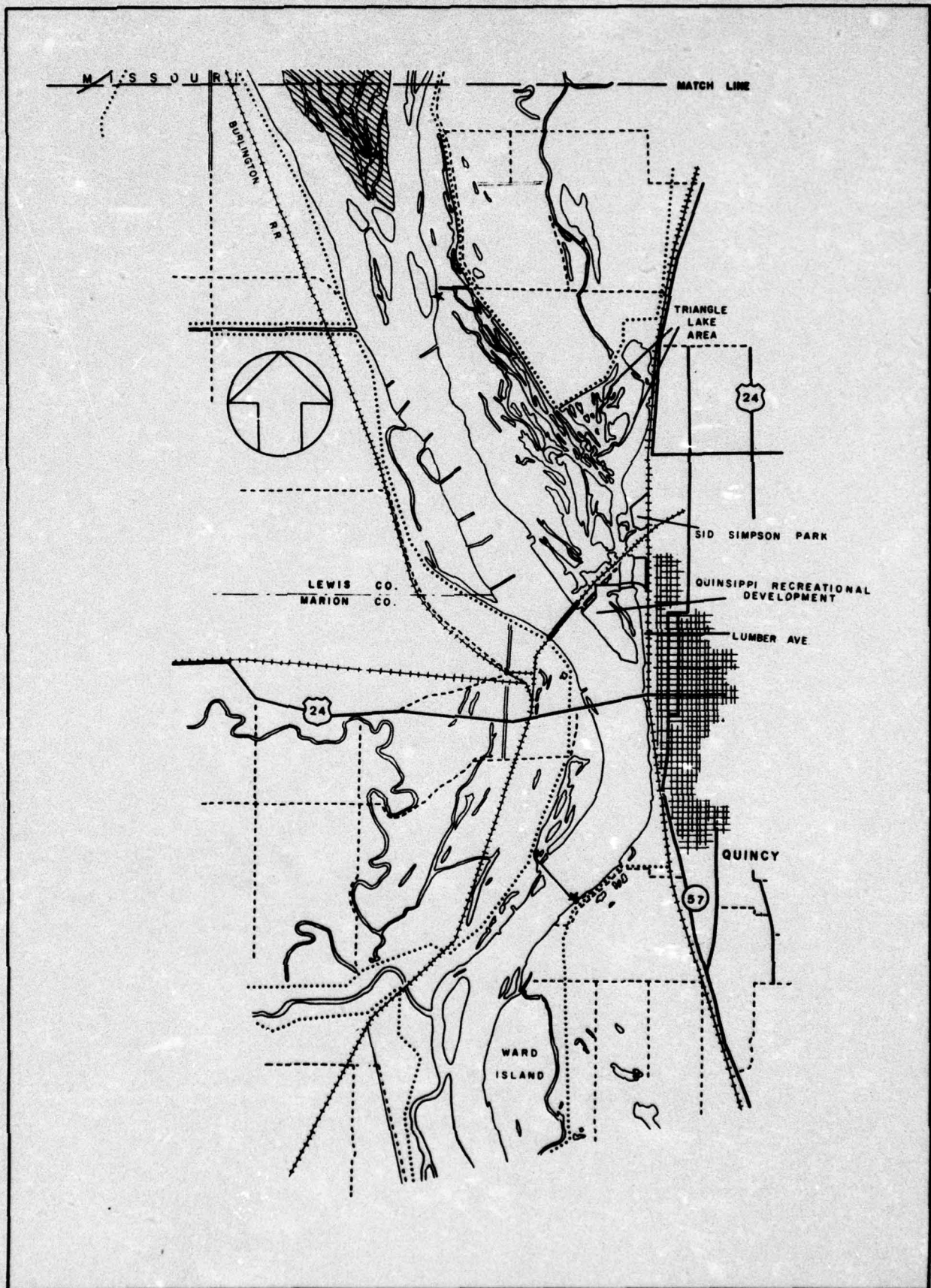
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B. Authorization and Purposes

MRP 21 was authorized by the River and Harbor Act of 1930 (PL 71-520). The project was originally authorized for navigation and flood control.^a The lock and dam were constructed in 1938 as a part of the 9-foot (ft) channel navigation project developed and maintained to provide commercial water access for the principal cities on the Mississippi River and its navigable tributaries from the Gulf of Mexico to points as far north as Minneapolis-St. Paul, Minnesota.

C. Features

The river in MRP 21 meanders through a broad floodplain and is contained within an area extending as wide as 3 mi by an intermittent system of levees and high ground. The floodplain generally consists of silty clay and decayed vegetable matter several ft thick. These materials came from the upper midwest and were deposited over centuries of recurrent high water periods. The soils in the floodplain are very fertile.

The project consists of an intricate system of islands and chutes. There are currently over 50 islands. The largest is Long Island running for 8 mi from river mi 832 to 840. Away from the 9-ft navigation channel, the flowage system is very complicated. Navigational knowledge and ability are required to ply the ever changing and interwoven chutes and islands safely. The islands support heavy stands of timber, primarily cottonwood, willow, maple, red birch, and locust in lower areas and ash, American elm, hickory, oak, hackberry, and linden on the

^aThe Secretary of the Army has been authorized, since 1944, to construct, maintain, and operate public park and recreational facilities at water resource development projects. 16 U.S.C. 460d. Since 1946, the Corps has been required, when consistent with a project's primary purposes, to make adequate provision for the conservation, maintenance, and management of resources. 16 U.S.C. 663(a).

somewhat higher land elevations. Large populations of deer occupy Long, Shandrew, Flanningan, and LaGrange Islands (1).

The Wyaconda River and four creeks flow into MRP 21. The Wyaconda is a small tributary which enters the Mississippi to the north of LaGrange. These streams are very responsive to rainfall and subsequent runoff which affects pool levels somewhat.

The authorized pool level is 470 ft above mean sea level (msl). Pool levels have varied 12.7 ft since full operation (Table D.9.1). Spring floods annually inundate the low-lying islands within the project and deposits of black silt are left by the flooding. On the floodplain beyond the low levees are extensive farming operations.

Table D.9.1. Resource Statistics, MRP 21.^a

Date of Authorization	1930
Rights of Land Acquired Between	1935 and 1942
Date of Impoundment	1936
Date of Full Operation	July, 1938
Pool Size When Water Level is at:	
Authorized Pool Elevation (470.0 ft msl)	6,350 acres
Channel Waters	917 acres
Off-channel Waters	5,433 acres
Water Fluctuation - Summer Recreation Season	N/A ^b
Shoreline of Authorized Pool	146 miles
Mainland	76 miles
Islands	70 miles
Held in Fee Simple by Corps	121 miles
Land Area Managed by Corps	
Total Land In Project	14,800 acres
Fee Title in U. S.	8,626.6 acres
Easements to Flood	661.7 acres
Project Operation Lands	120.9 acres
Manageable Resource Lands	7,667.4 acres ^c

^a Personal communication, September 1974 - January 1975. North Central Division, Real Estate Division, Rock Island Field Office, Management and Disposal Section, Rock Island, Illinois.

^b Not applicable; elevations of pools have varied a maximum of 12.7 ft; the lowest Mississippi River flows have resulted in a pool elevation only 2.5 ft lower than the authorized pool.

^c Total Project Land minus (Land Flooded at Normal Pool + Project Operations Land + Easements).

II. LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

A. Analytical Unit

The analytical unit is delineated by man-made characteristics which serve as barriers to access, land development and use, and inundation. The area which is immediately influenced by MRP 21 is delimited by the following features: on the north, L&D 20; on the east running from north to south, the levee, IL 7, U. S. 24, the Burlington-Northern Railroad in Quincy, and the levee; on the south, L&D 21; on the west running south to north, the levee, the Burlington-Northern Railroad at LaGrange, and U. S. 61 (Figure D.9.1).

B. Ownership

1. Corps

The Corps owns 8,627 acres at MRP 21. This property consists of approximately 45 islands with an estimated acreage of 5,160 or 60% of all lands owned by the Corps at MRP 21. There are 146mi of shoreline in the project; 121mi or 82% are owned by the Corps (Table D.9.2).

2. State Government

The MDC owns and operates two small public access points for boat launching purposes and automobile parking. These sites are located at Canton and LaGrange. The Illinois Department of Conservation (IDC) owns Myer Landing just below L&D 20; this public access area is operated by the Illinois Division of Parks and Memorials (IDPM).

3. County, Municipal, Special District

Quinsippi Island is owned and operated by the Quincy Park District (QPD), a separate local governmental unit created through enabling legislation of the State of IL. To the south of the Quinsippi Island complex, QPD owns a narrow strip of land between the shore and Burlington-Northern Railroad right-of-way.

Table D.9.2. Supplementary Resource Statistics, MRP 21.^a

Land area in fee Missouri	642.9 acres
Land area in fee Illinois	6,342.2 acres
Water area in fee Missouri	219.4 acres
Water area in fee Illinois	1,422.1 acres
Federally Owned Mainland Shoreline	61 miles
Non-federally Owned Mainland Shoreline	15 miles
Island Property (45 islands)	5,160 acres
Non-federal Island Property (5 islands)	647 acres
Estimated Land Accretions	86 acres
Federally Owned Island Shoreline	60 miles
Non-federally Owned Island Shoreline	10 miles
Pool Length (river miles)	18.3 miles

^aRock Island District. 15 May 1972. Revision of master plan for resource management; Pools 11-22 9-Foot Channel Navigation Project. Rock Island, Illinois.

4. Private

Nearly all lands bordering the project outside municipal limits are held by private agricultural interests. Between the Corps-owned Canton Chute public use area at river mi 332 and the northern end of the chute at mi 339, however, privately owned cottages line the shore behind the low levee; 25 of 121 mi of shoreline at the project are held by private interests (Table D.9.2).

C. Resource Management

1. Recreation

Public recreational areas at MRP 21 are limited to: 3 Corps facilities - Bear Creek, Canton chute, and L&D 21 public use areas; 2 QPD facilities - Sid Simpson Park and Quinsippi Island; 1 IDC/IDPM facility - Myer Landing picnicking and boat launching area; and 2 MDC facilities - LaGrange and Canton boat launching areas

a. Corps Facilities

Bear Creek is located on the northern end of Canton Chute on the IL shore. The facility is used for boat launching, picnicking, and camping. Although campsites are not defined, this public use area can accommodate 30 camping parties comfortably; during holiday weekends, warm periods, and normal pool stages, 90 camping parties have been counted. A boat ramp, water pump, pit toilets, several picnic tables, and garbage cans are the extent of the improvements at Bear Creek. Tables and cans are anchored and chained to trees so they will not wash away during high water periods. The site is muddy and generally devoid of ground cover under trees. Access to the site is via gravel roads which are often muddy or flooded. In 1973, 53,000 persons used this site.^a

^aVisitation at the Corps public use areas was recorded by electric automobile counters using a factor of 3.8 persons per vehicle. The figures are taken from RRMS records of 1973.

Canton Chute public use area is located at the mouth of Canton Chute. The area can accommodate 20 camping parties comfortably but 50 have been counted on some weekends. Campsites are not defined and facilities are comparable to those at Bear Creek. There were 47,000 visitors in 1973.

The L&D 21 public use area offers more sophisticated facilities to campers including flush toilets, running water, and paved roads. The landscaped park has 15 defined campsites, although 25 camping parties have been recorded at the facility during peak periods. The main attraction is the lock itself. Observation points have been constructed to allow spectators to watch river traffic go through the lock. There are picnicking and parking facilities provided to accommodate day-use visitors. There were 74,400 visitors in 1973.

Upkeep at Corps public use areas is as good as can be expected. Flooding is at least an annual occurrence at Bear Creek and Canton Chute. Silt deposits and debris removal are a management problem along with access maintenance and facility repair and replacement. Muddy conditions persist for long periods after flooding. At the present time there is a 6-10 inch deposit of silt covering the areas surrounding these two recreational sites.

The Corps contracts caretakers to clean the three public use areas. Caretaker responsibilities include cleaning campsites, emptying garbage cans, cleaning and emptying pit toilets, and reporting needs for maintenance. All areas are unattended by Corps employees. Contracts are handled through the Procurement and Supply Division and management is administered through the Mississippi River Projects Section of the Operations Division. Contracts are let on an individual public use area basis. Caretakers are paid an average of \$180 per month for services at the 13 projects.

In 1972, the Corps assigned 2 rangers to the Mississippi River projects to oversee recreational resources. There is 1 park manager and 1 park technician assigned to the 13 projects. They visit public use areas and patrol the projects by land on a continuing basis. Caretakers are directly responsible to the rangers (1).

b. Quincy Park District

The Corps leases 36 acres for public recreation use to QPD for Sid Simpson Park. The lease extends for 25 years terminating on 30 April 1999. Sid Simpson Park became the responsibility of QPD in 1972 when the Illinois State Legislature under Public Act 77-2189 removed the park from the IDPM system and transferred its facilities to QPD (2). IDPM had given the leased site little attention as a state park. Since becoming a QPD project, considerable investments and improvements have been made and planned (Table D.9.3).

The facilities at Sid Simpson Park include: campsites, running water, sewage dumping stations, restrooms, showers, electrical hookups, picnic areas, baseball and soccer fields, plus playground equipment for children. A boat launching ramp and boat trailer parking area constructed by the Corps are included at the park. QPD has not kept visitation counts, but it has recorded soccer games, wedding parties, church picnics, etc. since 1972 (3). State records were checked as far back as 1953 but it was found that no visitation counts were recorded for the park (2).

QPD owns and operates a theme park titled Quinsippi Island on Bay Island and on the east shore to the north of downtown Quincy. Access to the attraction is via a 1 mi long cable car ride from a motel/hotel complex in downtown Quincy or via a narrow gauge railroad from Lumber Avenue. Done in good taste, the park benefits from planning, quality development, and professional management. Included at the attraction

Table D.9.3. Outgrants for Fish and Wildlife and Recreation -- Public Parks, MRP 21.^a

Grantee	Instrument	Rental		Annual Rent Paid (\$)	Acreage	Investment	
		Date	Term (yrs)			to 1974 (\$)	Planned (\$)
Quincy Park District	Lease	1974	25	0	35.5	26,000	192,700
Illinois Department of Conservation Islands	License	1954	25	0	542.1	0	0
Illinois Department of Conservation Triangle Lake	License	1959	25	0	224.0	N/A ^b	N/A
U.S. Fish & Wildlife Service	License	1954 ^c 1963 ^d	25	0	6,028.0	N/A	N/A
Totals	4			0	6,829.6	26,000	192,700

^a Personal communication, September 1974 - January 1975. North Central Division, Real Estate Division, Rock Island Field Office, Management and Disposal Section, Rock Island, Illinois.

^b Not available.

^c Original lease.

^d Current lease.

are a 49 passenger excursion boat, zoo, 120 berth marina, 3 mi, 2-train narrow gauge railroad, antique automobile museum, Indian museum, log cabin village, picnic area, ferris wheel and carousel, and a retired steam locomotive and tender. Camping facilities are situated within walking distance to the north at Sid Simpson Park and at the KOA Camp-ground across the Burlington-Northern Railroad and IL 36 from Sid Simpson Park (3).

QPD owns a narrow strip of land between Quincy Bay and the Burlington-Northern Railroad right-of-way running generally from river mi 327 to 328. This land contains a public launching and picnic site, the Quincy Harbor, a private boat club marina, and a commercial recreational concession with boats for hire. Another launching ramp is situated at the foot of the U. S. 24 river bridge (3).

c. Missouri

The State of MO, Department of Natural Resources, Division of Parks and Recreation (MDPR), owns and operates Wyaconda State Park on the MO shore. The park lies about 3 mi inland. Because of the dearth of public access on the MO shore, the Corps has offered to construct a boat launching facility for the MDPR in the vicinity of river mi 333 at a point nearest to the park. The MDPR indicated that it could not accept the offer because of the distance from the park; by road the distance from the boat launch would be 4 mi. Also the low levee and the Burlington-Northern Railroad right-of-way paralleling the shore serve as barriers to access. Participation in access development was not feasible (1, 5).

The MDC operates boat access ramps in the vicinity of Canton and LaGrange. These are the only improved ramps open to the public on the MO shore along the 30 mi stretch of river from L&D 20 at Canton to L&D 22 at Hannibal (1, 6).

d. Illinois

The IDC owns a launching and picnic area at Myer Landing on the east shore at the Canton ferry slip below L&D 20. Improvements include a pit toilet, a water pump, and picnic tables. The facility is operated by the IDPM (1, 2, 4).

2. Pool Resources

The islands and chutes at MRP 21 are changing continually. Dredging is necessary to maintain the navigation channel, and wing dam construction and maintenance are needed to divert and discourage flow in the chutes (1).

The Corps has been active in providing access for recreation purposes in the vicinity of Quincy. In addition to building and maintaining 2 ramps, activities include the maintenance of the existing boat harbor at Quincy Bay under the River and Harbor Act of 1962, the construction of a harbor in Squaw Chute under the River and Harbor Act of 1960, and the construction and maintenance of a 6,000 ft small boat channel across Bay Island connecting the main channel with Quincy Bay under authority of the 1960 Act (7, 8).

Ecological problems along the river normally center around dredging and distribution of dredged materials, sand accumulation and land accretion, the increase of commercial traffic, vastly increased recreational boating, damage from wave action (shoreline erosion), and the natural phenomenon of flooding. Section 10 permits are now required for all new and changing uses along the river. The Environmental Protection Agency, IDC, and MDC must be notified via the A-95 Clearinghouse review process to insure quality development which will not upset the natural balance of the river system (1).

MRP 21 is not especially noted for good game fishing, although the pool offers a good habitat. No creel census is available. Walleye,

northern pike, sauger, bluegill, crappie, bass, freshwater drum, channel catfish, and bullhead are caught in pool waters. Commercial catches consist mainly of carp, buffalo, drum, paddlefish, and channel catfish (8).

3. Wildlife

The Corps licenses 6,028 acres to the USF&WS for wildlife management in the Gardner Division of the Mark Twain National Wildlife Refuge (Table D.9.3). The USF&WS administers an intensive management program on Long, LaGrange, Flannigan, and Shandrew Islands (29 mi of shoreline). Through cooperative arrangements with farmers, portions of crops are left in fields for feeding wildfowl and deer. On Long Island, the USF&WS plants peas, beans, and corn for wildlife food in areas where there is a large deer population. A farm implement maintenance and storage building has been constructed by USF&WS on Long Island (1).

Through a three-way general plan and agreement with the USF&WS and the Corps, the IDC manages 2,556 acres for wildlife enhancement. The IDC provides food for wildlife through cooperative agricultural arrangements with local farmers. Each year the IDC sponsors a 1-day bow and arrow hunt on Long Island to assist in deer population control (1, 4).

The IDC holds a license to manage 224 acres at Triangle Lake for recreation, boat access, and fish culture. Little management activity has taken place at this site in recent years. The area is low-lying and wet and accessibility is difficult (Table D.9.3) (1, 4).

The IDC also possesses a license to 542 acres for conservation purposes in the Quincy Bay area. Little management activity has occurred on this outgrant (Table D.9.3).

The IDC issues permits for 54 duck blinds in the three-way cooperative agreement area (Long, Shandrew, Flannigan, and LaGrange Islands).

In the Quincy Bay license area IDC issues 45 permits. Permits are issued on an annual basis and the IDC holds raffles in the area to determine who will receive permits. Blinds in the project area are of both the floating and stationary types (4). Abandoned and unused blinds detract from the aesthetic beauty of the project.

MDC wildlife management activities are limited at MRP 21. The MDC issues duck blind permits on the MO shore and operates launching ramps at Canton and LaGrange (6).

4. Other Land Uses

The Corps leases 76 cottage sites to individuals and one boat club at MRP 21 (Table D.9.4). The leases range from 20 to 25 years and are issued by bid with annual rents ranging from \$10 to \$100 depending upon location and acreage. The cottage sites are situated primarily on the IL shore and islands to the east of the navigation channel.

Many cottages are in poor condition because annual flooding discourages high investments and results in continual maintenance and repair. A large number of cottages are without running water and many are without electricity. Power generators are used on the islands in some cases. Most cottage sites are only accessible by water but many on the mainland can be reached easily when the ground is dry. A major problem is silt deposition. From 6 to 10 inches of black silt was deposited during the 1974 spring floods in low-lying areas on the east and west shore and on all islands and public use areas except the L&D 21 public use area and Sid Simpson Park.

The leasing of land for cottages has been judged by the North Central Division to be no longer feasible because of numerous management problems. High waters have been a problem and cottages have been swept away or damaged extensively. Other problems include domestic sewage disposal, trash and junk accumulation, tree removal, shoreline erosion,

Table D.9.4. Outgrants for Agriculture, Rights-of-way, Cottage Sites, Floating Docks, and Miscellaneous Purposes, MRP 21.^a

Purpose	Grantee	Outgrants	Instrument	Rental		Annual Rent Paid (\$)	Acreage	Investment	
				Date	Term (yrs)			to 1974 (\$)	Planned (\$)
Agriculture	M. D. Knaetheide	1	Lease	1965	5	40	5.2	N/A ^b	
Rights-of-Way	Summary	13	Easement	--	1-50	201	55.0	N/A	
Cottage Sites	Summary	76	Lease	--	20-25	2,631	71.2	N/A	
Floating Docks	Summary	25	Permits	--	25	310	0	N/A	
Miscellaneous	Summary	3	Lease/License	--	5-25	250	5.3	6,000	
Totals		118				3,432	136.7		6,000

^a Personal communication, September 1974 - January 1975. North Central Division, Real Estate Division, Rock Island Field Office, Management and Disposal Section, Rock Island, Illinois.

^b Not available.

debris buildup, encroachment, and vandalism. The Real Estate Division has decided to terminate all cottage leases by 1988 (1).

The Corps issues 25 special permits for floating docks at \$10 per year. The typical dock is made of heavy planks attached to 55-gallon drums. Each is required to be anchored securely or chained to trees. During flooding some docks float down stream. From time to time they are found in the remote chutes to the east of the navigation channel. The Corps is contemplating permit billing on a 5-year basis to alleviate the administrative work load in the Real Estate Division. All docks are required to be numbered and to display Corps permit forms.^a Corps costs for cottage lease and dock permit administration are about five times the revenues generated.

Quincy College leases a small isolated island to the north of Quincy. The site is remote, unused, and accessible only with great difficulty. The site has not been visited by Corps real estate staff within the past 2 years. The purpose of this lease is to provide a field experience for study in the natural sciences (1).

There are a number of leases for electrical and telephone rights-of-way and easements. These are generally long term leases. No major transmission trunks cross Corps-owned land; all are leases to provide access for service to subscribers (Table D.9.4).

The Corps leases 5 acres on Cottonwood Island to a private individual for agricultural purposes. This is the only lease which is let for this purpose. It is renewable on a 5-year basis (Table D.9.3).

^aSeveral unnumbered and loose docks were found on the field reconnaissance trip of 17-18 October 1974. Real Estate Division personnel recorded the incidences.

Timber management is conducted by the Corps in cooperation with the USF&WS and IDC. There are 6,564 acres with significant timber stands in the pool area: 6% or 394 acres are classified for recreational use; 72% or 4,726 acres are set aside for wildlife-waterfowl management; and 23% or 1,444 acres are for wildlife-upland game use (8). Since 1941, the Corps has had a timber management program at the project which directs the selected harvesting of mature trees. A forester is hired in the Environmental Resources Branch of the Engineering Division. Timber sales are advertised, and contracts are granted to private interests for cutting. Monies from these transactions are placed in Corps revolving funds. The long-range management objectives are increased annual yields, timber quality improvement, and enhancement of species composition (9).

Proper timber management has been lacking because of the small numbers of personnel available and assigned for this work. Additional staff is needed to upgrade inspection and policing of timber lands. Unauthorized timber removal often goes undetected for months. When people are apprehended for timber removal, attempts for compensation of the value of timber removed are generally 75% successful. The Corps usually does not take court action for recovery because the value of removed trees normally is only \$500-1,000. The Real Estate Division tries to recover funds through letter writing and visiting suspects. Attempts to collect are generally proportional to the value of the loss - the higher the claim, the stronger the collection effort (1).

Beyond the corporate limits of Quincy there are no locally applied land use controls. The natural setting of the floodplain, the man-made features such as railways and levees, and the lack of good access form protective barriers to incompatible land uses. Private development is limited primarily to cottages which are built behind the low levee along the eastern shore.

Of the 8,267 acres held in fee by the Corps, 6,968 acres or 85% have been outgranted for various purposes. The largest amount of acreage has been outgranted for wildlife management to the USF&WS and IDC. All other outgranted lands amount to only 137 acres (Table D.9.5).

5. Resource Use Controls

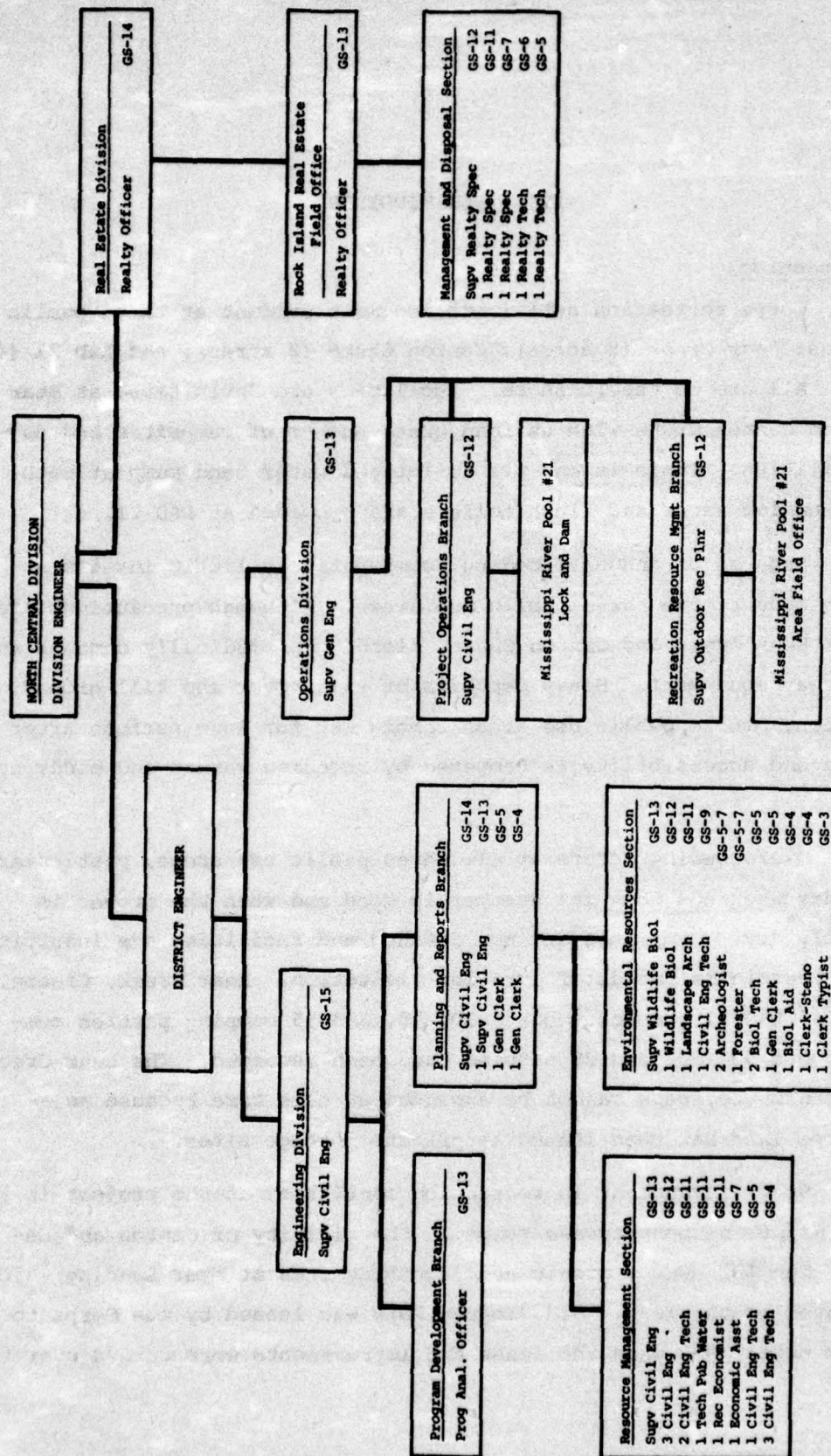
The Corps operational staff at MRP 21 is limited to lock and dam operation. The staff consists of the lock master, his assistant, and a crew to operate and maintain the lock and dam on a round-the-clock basis. Two rangers are responsible for patrolling all 13 navigation pools in the District's jurisdictional area which covers 353 river mi extending from Guttenburg, Iowa to Clarksville, MO (1). Recreation-resource management interrelationships for the Rock Island District are shown in Figure D.9.2.

The Missouri Boating Commission (MBC) patrols the waters and the shore to the west of the main channel. The river pools are not readily accessible to the MBC. Long waiting periods are required to move through the locks from one pool to another in cases of emergency. Some lock masters are not as cooperative as others and the MBC is required to wait for other traffic with higher priority. This problem is exacerbated by the lack of launching ramps on the MO Shore in MRP 20, 21, and 22 (10).

Table D.9.5. Summary of Outgrants, MRP 21.

Purpose	Number	Annual Rent (\$)	Acreage	Investment to 1974 (\$)
Fish and Wildlife and Recreation - Public Parks	4	0	6,831.6	26,000
All Other Purposes	<u>118</u>	<u>3,432</u>	<u>136.7</u>	<u>6,000</u>
Totals	122	3,432	6,968.3	32,000

Figure D.9.2. Recreation-Resource Management Interrelationships - Rock Island Engineer District.



III. KEY FINDINGS

A. Recreation

1. Corps recreation activities are most evident at three public use areas: Bear Creek (5 acres), Canton Chute (2 acres), and L&D 21 (4 acres). All are on the IL shore. Facilities are "primitive" at Bear Creek and Canton Chute with an inadequate number of campsites and day-use facilities. There is one pit toilet and water hand pump at each site. Running water and flush toilets are provided at L&D 21.

2. Because of annual flooding, comparatively little investment has been made at the three public use areas. Although precautions are taken at Bear Creek and Canton Chute, flooding periodically damages and washes away equipment. Heavy deposits of silt cover and kill ground vegetation. These public use areas remain wet for long periods after flooding and accessibility is hampered by receding waters and muddy conditions.

3. Overcrowding occurs at all three public use areas, particularly on holiday weekends when the weather is good and when the ground is relatively dry. Campsites are not defined and facilities are insufficient to meet the minimal needs of even low visitation. Bear Creek, Canton, Chute, and L&D 21 can accommodate 30, 20, and 15 camping parties comfortably but 90, 50, and 25 parties have been recorded. The Bear Creek and Canton Chute areas cannot be expanded at this time because adjacent Corps land has been leased as private cottage sites.

4. State investment in recreation facilities at the project is low. The MDC maintains boat access ramps in the vicinity of Canton and La-Grange. The IDC owns a picnic and launching area at Myer Landing which is operated by the IDPM. Sid Simpson Park was leased by the Corps to the IDPM until 1972 when the lease and improvements were turned over to the QPD.

5. Since the QPD took over operation of Sid Simpson Park, the facility has been substantially improved. The QPD also manages Quinsippi Island. High quality recreational opportunities have been provided at both locations.

6. No other local governmental units have developed or now operate recreational facilities at MRP 21.

B. Fish and Wildlife

1. The USF&WS manages Long Island as part of the Gardner Division of the Mark Twain National Wildlife Refuge. Management efforts consist primarily of cultivating crops such as peas, beans, and corn for deer food. The deer population is controlled through annual bow and arrow hunts sponsored by the IDC.

2. Two-year licenses for 54 duck blinds on and around Long Island and 45 blinds on and around Triangle Island are raffled by the IDC. Remnants of abandoned blinds detract from the natural beauty of the pool.

3. MDC wildlife management activities at MRP 21 are limited to the issuing of duck blind permits and operating launching ramps at Canton and LaGrange.

C. Corps and Contiguous Land Use

1. Land used for Corps operations is limited to the lock and dam complex and to the three public use areas amounting to 131 acres or less than 1% of total project acreage. Nearly all of the Corps-owned lands in the project are outgranted to and managed by the USF&WS and IDC.

2. Use of lands lying contiguous to the project, except for those within the planning jurisdiction of the City of Quincy, is uncontrolled by local governments. No land-use planning or related legal tools, such as zoning, subdivision regulation, and building inspection, are in effect beyond Quincy. In lieu of local land use guidance, flood hazards and

poor accessibility serve as protective controls to discourage intensive urban-type land development along the shores of the pool. There appears to be no threat from land development pressures.

3. Beyond corporate limits of Quincy, Canton, and LaGrange, the Corps holds flowage easements behind low levees. Crops are planted on these rich black soils. Within the communities of Quincy, Canton, and LaGrange, shoreline uses consist primarily of commercial and industrial harbor operations such as barge docks, marinas, raw product storage and processing, and manufacturing. Shoreline has also been allocated for recreational use in Quincy.

4. The Corps is under continuing local pressure to improve and maintain accessibility for pleasure, sport, and commercial boat traffic at Quincy Harbor. The harbor area has been deepened, launching ramps have been built, and a channel has been opened to provide small boat access to the 9-ft navigation channel.

D. Real Estate Programs and Practices

1. The North Central Division real estate staff assigned to the Rock Island District has the responsibility for administering and inspecting the 76 leased cottage sites and the 25 docks allowed under special use permits. Because Rock Island is nearly 100 mi away, division staff is unable to perform this task adequately. The MRP 21 project staff does not participate in this function. Therefore, lease sites and docks are inspected infrequently - no more than once per year.

2. Twenty-five floating docks are authorized through 5-year special use permits issued by the Corps. Docks are hazards to navigation when they break loose and drift downstream during and after flooding. Several stray docks are found on each inspection tour, particularly in remote chutes. All stray docks found on this year's trip were untagged and a few unauthorized docks were discovered anchored to trees in hidden and

out-of-the-way chutes. Dock fees of \$10 are collected annually. The Real Estate Division is contemplating collecting the total 5-year term fee at the time of permit issuance, substantially reducing the collection work load.

3. Annual income for cottages, licenses, special use permits, and other outgrants is \$3,432. Staff costs to administer this program (including salaries, billing, fee collection, and field inspection) are nearly five times the income.

E. Corps Organization

1. The North Central Division real estate staff assigned to the Rock Island District is performing tasks which normally would be handled by an expanded local project staff. Some infield tasks could be handled more effectively from the local level.

2. The assignment of North Central Division real estate staff to the Rock Island District office has worked very well. Strong relationships and good rapport between division and district staff prevail.

3. Two rangers were assigned in 1972 to patrol all 13 navigation pools within the Rock Island District. The rangers are unable to patrol the area effectively because of its large size. The Corps contracts persons to maintain and oversee the three public use areas. Their responsibilities are to keep the areas clean, to empty pit toilets, and to report need for maintenance. The MRP 21 staff is assigned specifically to lock and dam operation.

IV. REFERENCES

1. Personal communication, September 1974 - January 1975. North Central Division, Real Estate Division, Rock Island Field Office, Management and Disposal Section, Rock Island, Illinois.
2. Personal communication, 9 September 1974. Illinois Department of Parks and Memorials, Springfield, Illinois.
3. Personal communication, 18 October 1974. Quincy Park District, Quincy, Illinois.
4. Personal communication, 9 September 1974. Illinois Department of Conservation, Springfield, Illinois.
5. Personal communication, 12 September 1974. Missouri Department of Natural Resources, Division of Parks and Recreation, Jefferson City, Missouri.
6. Personal communication, September - December 1974. Missouri Department of Conservation, Division of Wildlife, Jefferson City, Missouri.
7. Personal communication, 10 September 1974. Rock Island District, Engineering Division, Rock Island, Illinois.
8. Rock Island District, Engineering Division, Planning and Reports Branch. 1972. Revision of master plan for resource management: Pools 11-22 9-foot Channel Navigation Project. Rock Island, Illinois.
9. Personal communication, 17 October 1974. Rock Island District, Operations Division. Rock Island, Illinois.
10. Personal communication, 12 September 1974. Missouri Boating Commission, Jefferson City, Missouri.

10. LAKE ASHTABULA
North Central Division
St. Paul District
North Dakota

I. SETTING

A. Location

Lake Ashtabula is located on the Sheyenne River in Barnes and Griggs Counties, North Dakota (Figure D.10.1). Access to the lake is provided by a network of secondary roads, most of which are unimproved. Valley City, ND, population 7,843, and Cooperstown, ND, population 1,485, are the largest urban areas in the immediate vicinity (1); the Fargo-Morehead SMSA is located about 75 road miles (mi) east-southeast of the project.

B. Authorization and Purposes

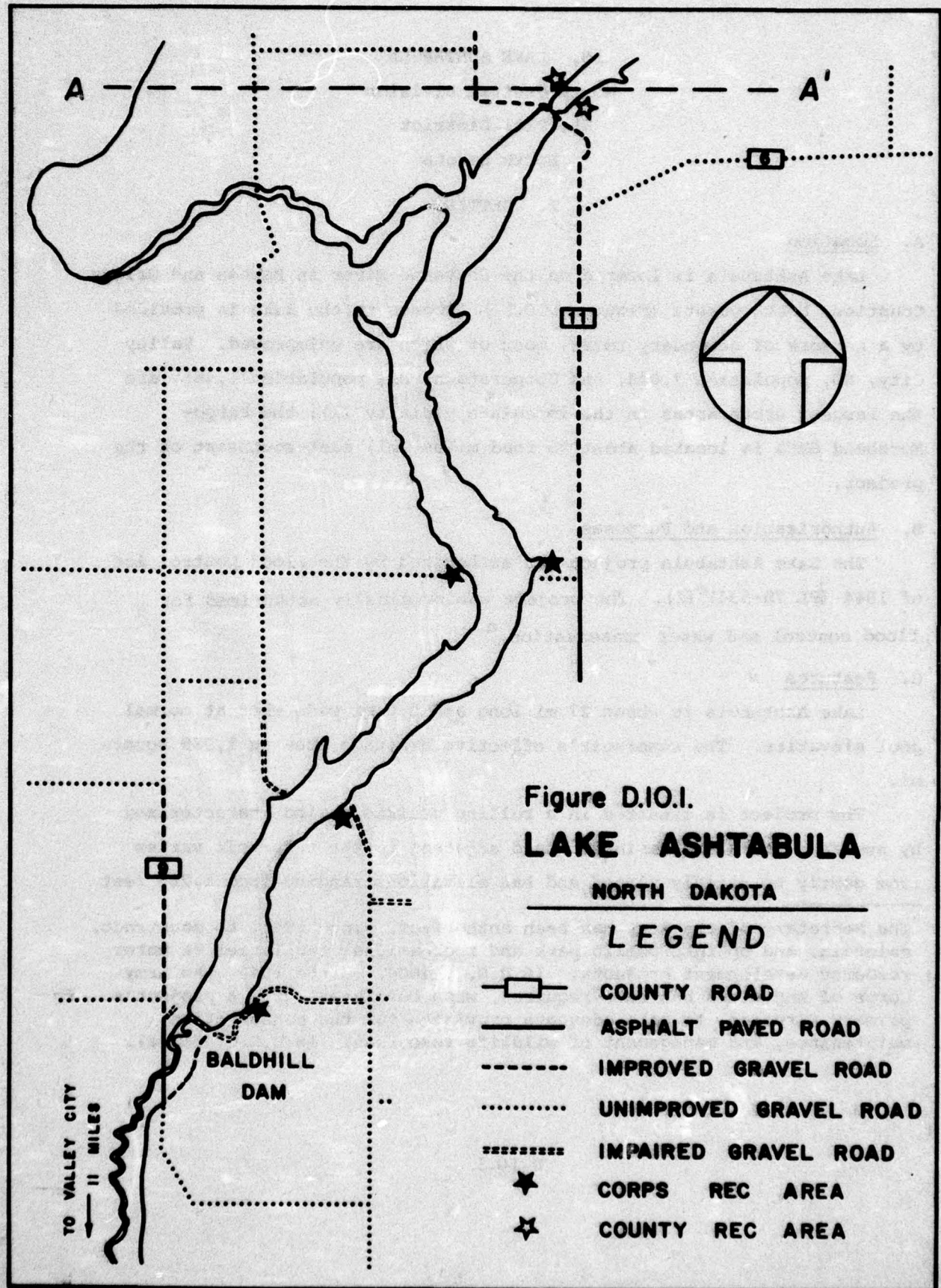
The Lake Ashtabula project was authorized by the Flood Control Act of 1944 (PL 78-534) (2). The project was originally authorized for flood control and water conservation.^a

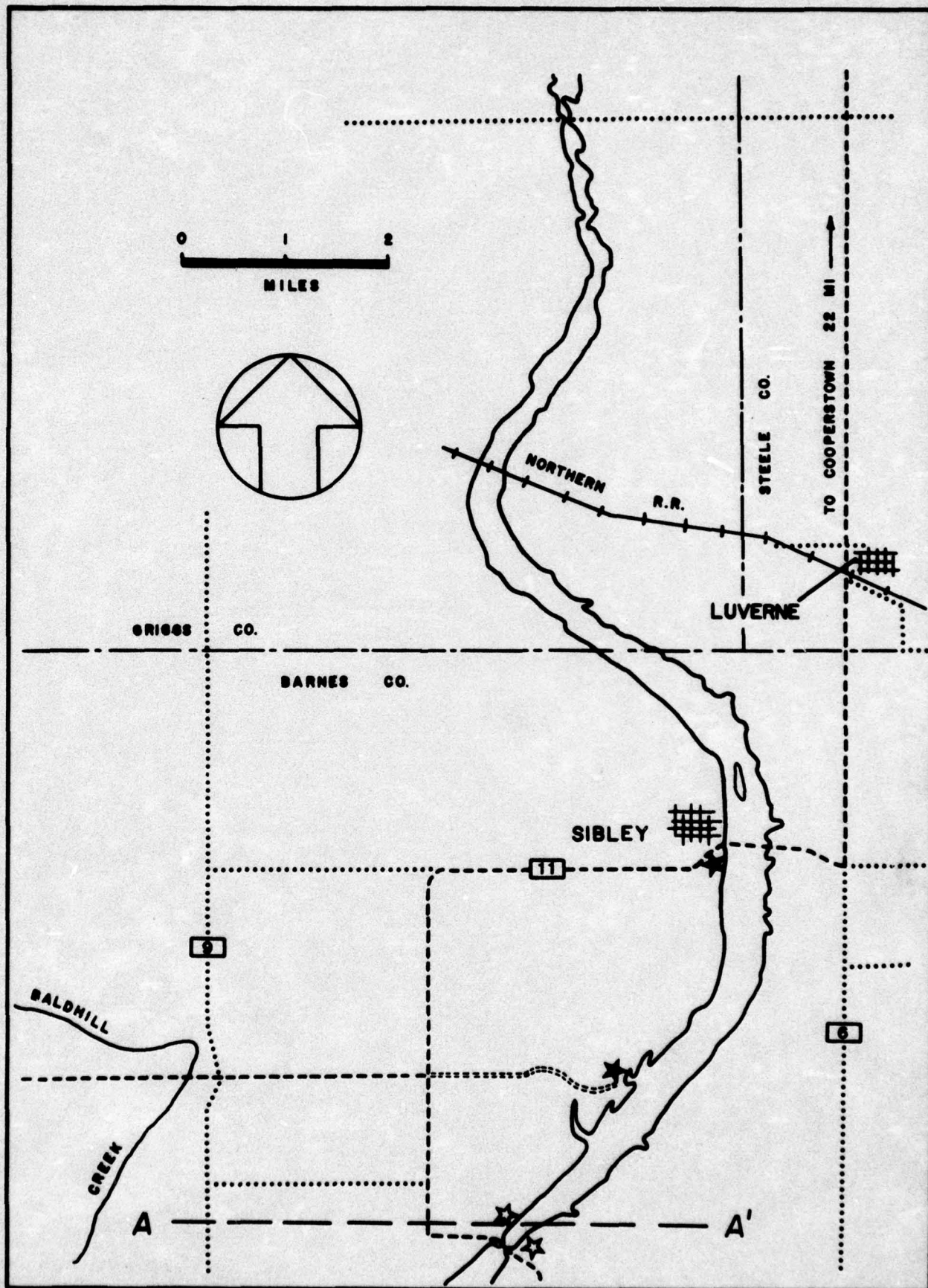
C. Features

Lake Ashtabula is about 27 mi long and 0.6 mi wide when at normal pool elevation. The reservoir's effective drainage area is 1,988 square mi.

The project is situated in a rolling prairie region characterized by numerous hills and ravines. Land adjacent to the reservoir varies from gently to steeply sloped and has elevations ranging from 1,265 feet

^aThe Secretary of the Army has been authorized, since 1944, to construct, maintain, and operate public park and recreational facilities at water resource development projects. 16 U.S.C. 460d. Since 1946, the Army Corps of Engineers has been required, when consistent with a project's primary purposes, to make adequate provision for the conservation, maintenance, and management of wildlife resources. 16 U.S.C. 663(a).





D.10.2.A

mean sea level (ft msl) to 1,570 ft msl. Vegetation is dominated by grassland species; woody vegetation is scarce and restricted to stream borders, ravine bottoms, and planted shelterbelts. Woody plants present include ash, elm, burr oak, choke cherry, pin cherry, wild plum, and currant (2).

Other project features are shown in Table D.10.1.

Table D.10.1 Resource Statistics, Lake Ashtabula.

Date of Authorization	1944 ^a
Rights in Land Acquired Between	1947 - 1952 ^b
Date of Impoundment	April, 1951 ^c
Date of Full Operation	April, 1952 ^c
Lake Size When Water Level is at:	
Tainter Gate Elevation (1,267 ft msl)	7,250 acres ^d
Normal Pool Elevation (1,266 ft msl)	5,430 acres ^d
Normal Minimum Pool Elevation (1,262.5 ft msl)	4,500 acres ^e
Minimum Design Elevation (1,252 ft msl)	2,150 acres ^e
Water Fluctuation - Summer Recreation Season	3.5 feet ^e
Shoreline at Normal Pool Elevation	78 miles ^{a,f}
Held in Fee Simple by Corps	78 miles ^{g,f}
Land Area Managed by Corps	
Total Land in Project	8,483 acres ^c
Fee Title in U. S.	7,817 acres ^c
Easements	666 acres ^c
Riverbed	500 acres ^c
Project Operation Lands	20 acres ^e
Manageable Resource Lands	2,367 acres ^h

^a St. Paul District. 1967. Master plan for resource management: Baldhill Dam and Lake Ashtabula Reservoir. St. Paul, Minnesota.

^b Personal communication, 19 November 1974. St. Paul District Real Estate Field Office (North Central Division), St. Paul, Minnesota.

^c RRMS. 1973.

Table D.10.1. (Continued)

^d St. Paul District. ND. Baldhill Dam and Lake Ashtabula Reservoir.
St. Paul, Minnesota. (Brochure).

^e Personal communication, 14 and 20 November 1974. Operations Division,
St. Paul District, St. Paul, Minnesota.

^f 70 miles according to RRMS 1973.

^g Personal communication, 28 August 1974. Project level (Baldhill Dam),
St. Paul District, St. Paul, Minnesota.

^h Total Project Land minus (Land Flooded at 1,266 ft msl + Project Opera-
tion Land + Easements).

II. LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

A. Analytical Unit

No structured studies have been conducted to determine the geographic limits of the reservoir service area. The project master plan assumes the majority of visitors originate within 50 mi of the reservoir. Based on this assumption, the reservoir service area includes portions of 13 counties and had a 1970 population of 233,466 (Table D.10.2). Populations of the 13 counties increased 3% between 1960 and 1970 but decreased 15% in the two counties bordering the project (1).

The presence of the reservoir has not had a significant impact on land use of the surrounding area. Preconstruction and present usage of lands contiguous to the project consist primarily of grazing and growing grain crops. Farms in the area are large (several hundred acres per farm) and farming practices are mechanized. Residential growth in the area has been limited to the establishment of cottages, most of which are used only during the summer months. Commercial and industrial growth in the area has been negligible. Only two commercial concessioners were noted on private land near the reservoir and no industries were observed.

Land use of the surrounding area, on the other hand, has had a significant influence on the reservoir and has caused serious encroachment, erosion, and eutrophication problems.

B. Ownership

The Corps has acquired fee title or flowage easements to all lands contiguous to the lake (2). Lands contiguous to the project boundary are privately held except for a 14-acre tract purchased by the North Dakota State Game and Fish Department (NDSGFD) (5). The project boundary was monumented in 1950 but markers have been poorly displayed.

Table D.10.2. Populations of Lake Ashtabula Service Area.^a

County	Population		Percent Change
	1960	1970	
Barnes	16,719	14,669	-12.3
Benson	9,435	8,245	-12.6
Cass ^b	66,947	73,653	10.0
Eddy	4,936	4,103	-16.9
Foster	5,361	4,832	- 9.9
Grand Forks	48,677	61,102	25.5
Griggs	5,023	4,184	-16.7
La Moure	8,705	7,117	-18.2
Nelson	7,034	5,776	-17.9
Ramsey	13,443	12,915	- 3.9
Steele	4,719	3,749	-20.6
Stutsman	25,137	23,550	- 6.3
Trail	10,583	9,571	- 9.6
Totals	226,719	233,466	Net Change 3.0

^aU. S. Bureau of the Census. 1971. U. S. Census of population: 1970. Number of inhabitants: North Dakota. Washington, D. C.

^bCass County comprises the North Dakota portion of the Fargo-Morehead SMSA.

C. Resource Management

1. Recreation

(a) Corps

Eight percent of Lake Ashtabula's manageable resource lands have been developed for public recreation; an additional two percent have been outgranted for quasi-public recreation (6). The Corps has invested \$425,573 of Code 710 funds in recreation facilities at Lake Ashtabula and Barnes County has invested approximately \$130,000 (7, 8). The Corps built some recreation facilities with project funds but the amount spent was not readily available.

The project master plan indicates that local citizen groups and public park agencies were consulted by the Corps to determine recreation needs of the local area and that these needs were incorporated during the initial recreation planning stage. According to the master plan, recreation programs are presently designed to accommodate peak day (July 4) visitation pressures (2).

Basic minimum facilities at the reservoir's eight existing public recreation sites were constructed by the Corps. Barnes County added complementary facilities and executed third party leases for commercial concessions. The county operated all recreation areas and administered all concessions until county appropriations became limited in 1965. The county then withdrew from all but two of the recreation areas (Table D.10.3) forcing the Corps to accept administrative responsibility for the facilities and existing concession agreements on the relinquished areas. The Corps leased one of the relinquished sites to the Village of Sibley, but the site was reverted to Corps operation in 1972 due to loss of village interest (7, 8).

Existing public recreation facilities have been located in the lower portion of the reservoir because attractively wooded areas are

Table D.10.3. Outgrants for Fish and Wildlife and Recreation -- Public Parks, Lake Ashtabula. ^a

Grantee	Instrument	Rental		Annual Rent Paid (\$)	Acreage	Investment	
		Date	Term (yrs)			to 1974 (\$)	Planned (\$)
N.D. State Game and Fish Dept.	License	1955	25	0	1,419.0 ^b	N/A ^c	N/A
U.S. Fish and Wildlife Service	Permit	1950	Indef.	0	39.5	N/A	N/A
Total (Fish and Wildlife)	2			0	1,458.5	N/A	N/A
Barnes County	Lease ^d	1954	25	0	35.2 ^d	N/A	N/A
Sibley Village	Lease	1965	10 ^e	— ^e	9.5 ^e	N/A	-- ^e
Total (Public Parks)	1			0	35.2	N/A	N/A
Grand Total	3			0	1,493.7	N/A	N/A

^a Personal communication, 15 November 1974. St. Paul District Real Estate Field Office (North Central Division), St. Paul, Minnesota.

^b 279 acres were added since 1955.

^c Not available.

^d Originally a license for 148 acres; amended 15 April 1956; original acreage was more than county could effectively manage.

^e Relinquished in 1972 -- finances unavailable.

present and slopes are more favorable for facility installment. Nearly all sites are small; extensive development has been limited by the narrow width of Corps land and frequent location of forested areas in narrow ravines and valleys (2).

The Corps presently operates six recreational areas which encompass 147 acres; one site comprises 48% of the total acreage. Facilities provided at the Corps areas in 1973 included 109 picnic sites, 49 camping sites, 2 swimming beaches, 6 launching ramps, 7 launching lanes, and 6 parking lots with spaces for 445 cars. The two recreation sites leased to Barnes County occupy 35 acres and in 1973 provided 75 picnic sites, 60 camping sites, 2 launching ramps, 2 launching lanes, and 1 parking lot with spaces for 120 cars (4).

The Corps currently administers two concessions which occupy 2 acres (Table D.10.4). No changes in ownership have occurred at either concession. A third concessioner failed to renew his lease after expiration in 1972 because business was unprofitable (6).

Visitation to Corps-operated recreation areas from May to October 1973 was 307,800, and to Barnes County sites, 92,600^a (4).

Visitation rates at Lake Ashtabula are determined by mechanical vehicle counters. The counters are checked weekly on a weekday and the 3.8 NPS carload factor is used to estimate total visitation. Reservoir personnel noted that the NPS figure is too high for Lake Ashtabula and that a carload factor of 2.8 to 3.0 is more realistic. A survey was implemented during the 1974 summer recreation season to obtain a more accurate carload factor. The survey was in progress during our visit and thus results were unavailable. No other visitation surveys are conducted by the project-level staff (6).

^aVisitation is not monitored during the winter months (3).

Table D.10.4. Outgrants for Recreation -- Commercial, Lake Ashtabula. ^a

Location	Grantee	Instrument	Rental		Annual Rent Paid (\$)	Acreage	Investment		Turnovers
			Date	Term (yrs)			to 1974 (\$)	Planned (\$)	
Eggert's Landing	George Freadhoff ^b	Lease	1972 ^c	5	Fixed	1.53	17,000	N/A ^d	0
Main Public Use Area (damsite)	Robert Paulson	Lease	1966 ^e	5	Fixed	0.53	--	--	0
			1971	5	Fixed	0.53	11,016	N/A	
Sundstrom's Landing	Robert F. Rieger	Lease	1966 ^f	5 ^g	Fixed	1.10	5,984	--	0 ^g
Totals (Current)	2					2.06	28,016	N/A	0 ^h

^a Personal communication, 15 November 1974. St. Paul District Real Estate Field Office (North Central Division), St. Paul, Minnesota.

^b Grantee also has snowmobile - boat shop adjacent to Corps property.

^c Grantee leased from county 10- years before 1972.

^d Not available.

^e Grantee leased from county from 1955-1966.

^f Grantee previously leased from county (period unknown).

^g Lease was not renewed in 1971 (grantee claimed operation was unprofitable).

^h One lease not renewed.

Day use facilities at Lake Ashtabula are more extensively utilized than overnight facilities primarily because most reservoir visitors originate locally (4). RRMS 1973 data indicate that picnicking, fishing, and water skiing are the major visitor interests and account for 65%, 25%, and 15%, respectively, of reservoir activity use. Camping accounts for only 5% of activity use but all sites are usually filled on holidays and nearly filled on weekends during the summer. No fees are presently charged at Corps recreation sites but a \$1 camping fee is charged at the recreation areas operated by Barnes County. Fees are collected on the honor system and the collection method is apparently functioning with relatively few problems (3). Fees collected are placed in a rotating fund for county park construction and maintenance. Additional funds for Barnes County parks are raised by a tax levied on county residents (3).

Several existing public recreation sites at Lake Ashtabula have been poorly designed and do not allow realization of maximum benefits and utilization. Parking lots, in particular, have been located on the more select, level areas and possibly occupy land that could be better utilized for other purposes (2). Parking lots are frequently located between the shoreline and visitor use facilities, detracting from the reservoir's aesthetic appearance and degrading the quality of the visitor's recreation experience. Inadequate separation of day from overnight use facilities has also been a factor affecting quality recreation experiences at several sites (8).

The reservoir is utilized for ice fishing, ice boating, ice skating, snowmobiling, and some family activities during the winter. However, the Corps' recreation program is not designed to accommodate such activities; no winter recreation facilities are provided by the Corps and usage of project land is not strictly regulated. In addition,

Corps project-level staffing during the winter consists of only three employees, two of which also have duties to perform at other St. Paul District reservoirs. Lack of a structured, winter recreation program prevents realization of the reservoir's maximum recreation potential and jeopardizes the quality of existing reservoir resources (from vandalism, misuse, etc.).

Development of any new recreation sites at Lake Ashtabula are required cost-sharing under Code 710 program (7). Inadequate funding presently restricts the cost-sharing capabilities of Barnes County (8).

The Corps has granted 18 leases for quasi-public recreation but only four are currently active (Table D.10.5) (6). Granting leases to non-profit organizations for recreational purposes has the potential of creating high social benefits. However, outgrants to such groups at Lake Ashtabula have frequently failed due to a reduction in group interest, improper management, or lack of funding (3, 6). It seems possible that the recreation needs of the four organizations could be met at the existing facilities at the lake.

(b) Private

Presently about 100 cottages exist adjacent to the reservoir and are concentrated in 9 locations (4). All are on private land purchased or rented from agricultural landowners. Cottage upkeep varies from poor to excellent.

Numerous unauthorized private facilities have been constructed on Corps property because (1) the cottages are located in close proximity to Corps property, (2) Corps boundary line monuments are not clearly displayed, and (3) Corps patrol surveys were not aggressive in the past. Over 100 encroachments are known to presently exist. The Corps has not taken action to eliminate these violations but legitimizing special use permits and licenses have been recently issued to most violators (3).

Table D.10.5. Outgrants for Recreation -- Quasi-Public, Lake Ashtabula..^a

Grantee	Instrument	Date	Rental Term (yrs)	Basis	Current Annual Rent (\$)	Acreage	Investment to 1974 (\$)	Planned (\$)
Nebo Lutheran Church	Lease	1963	10 ^b	\$1/term	-- ^b	7.6	N/A ^c	-- ^b
Valley City State College	Lease	1952	20	N/A	N/A			
		1972	5 ^d	\$50/year	-- ^d	24.2	N/A	-- ^d
Michigan Lutheran Church	Lease	1961	25 ^e	\$1/term	-- ^e	4.5	N/A	-- ^e
Luthran Welfare Society	Lease	1962	25	\$1/term	0 ^f	5.0	N/A	N/A
Griggs County Wildlife Assoc.	Lease	1955	25	\$25/year	25	1.0	N/A	N/A
St. Catherine's Parish	Lease	1955	25	\$1/term	-- ^g	38.5	N/A	-- ^g
Lutheran Brotherhood	Lease	1954	25	\$1/term	-- ^h	9.7	N/A	-- ^h
Binford Wildlife	Lease	1959	25	\$30/year	-- ⁱ	2.8	N/A	-- ⁱ
American Legion	Lease	1955	25	\$30/year	-- ^j	2.8	N/A	-- ^j
Trinity Lutheran	Lease	1963	10 ^b	\$1/term	-- ^b	6.8	N/A	-- ^b
Young Democrats	Lease	1954	25	\$30/year	-- ^k	6.2	N/A	-- ^k
Congregational Church of Christ	Lease	1955	25	\$1/term	0 ^f	6.0	N/A	N/A
N.D. National Guard	Lease	1956	20	\$1/term	0 ^f	33.3 ^l	N/A	N/A
All Saints Episcopal Church	Lease	1959	25 ^e	\$1/term	-- ^e	3.0	N/A	-- ^e

Table D.10.5. (Continued)

Grantee	Instrument	Date	Rental		Current Annual Rent (\$)	Acreage	Investment	
			Term (yrs)	Basis			to 1974 (\$)	Planned (\$)
Weedland Rod & Gun Club	Lease	1955	25 ^m	\$30/year	-- ^m	3.0	N/A	-- ^l
Valley City Lions Club	Lease	1962	10	\$1/term	-- ^m	82.0	N/A	-- ^m
Haniford American Legion	Lease	1954	25 ^m	\$30/year	-- ^m	6.1	N/A	-- ^l
V.F.W.	<u>Lease</u>	1957	25 ^o	\$25/term	-- ^o	<u>7.6</u>	<u>N/A</u>	-- ⁿ
Totals (Current)	4	--	--	--	25	45.3	N/A	N/A

D.10.15

^a Personal communication, 15 November 1974. St. Paul District Real Estate Field Office (North Central Division), St. Paul, Minnesota.

^b Expired -- no development.

^c Not available.

^d Relinquished in 1974 -- finances unavailable.

^e Terminated in September 1974 -- no utilization.

^f Less than \$0.50.

^g Terminated in December 1965 -- no development.

^h Terminated in June 1961 -- no development.

ⁱ Cancelled by Corps in May 1966 -- improper maintenance.

^j Terminated by Corps in January 1966 -- no development.

Table D.10.5. (Continued)

k Terminated by Corps to be used for better purposes.

l 7.6 acres added in May 1968.

m Cancelled -- date unavailable.

n Not renewed -- no development.

o Terminated March 1968 -- improper maintenance.

RRMS 1973 data indicate that permits have been issued for 40 individual and 10 community private boat docks. Data from the North Central Division's Real Estate Field Office indicates that 40 special use licenses have been issued for private boat houses, storage sheds, water systems, etc. Both permits and licenses are issued for a 5-year period. No fees are charged for permits but a \$10 annual fee is charged for licenses. Fees collected are deposited in the U. S. Treasury as general receipts (6).

2. Lake Resources

The North Dakota State Department of Health (NDS DH) has classified waters of the Sheyenne River as IA (suitable for water recreation, irrigation, stock watering, fish propagation, and wildlife usage); Baldhill Creek waters were classed II (similar to IA except that additional treatment may be required for drinking purposes) (9). Despite the high classification of tributary waters, a serious eutrophication problem currently exists in the reservoir. Large blooms of blue-green algae (mostly Aphanizomenon) occur during the summer months and are objectionable to swimmers and boaters (10). Algal blooms mainly result from domestic sewage and livestock and farming operations.

Erosion and sedimentation caused by wave action and trespass cattle grazing have also degraded reservoir water quality and pose a threat to fishery resources (5). The Corps is not attempting to control erosion except where recreational facilities or other project structure are endangered. Reservoir personnel indicated that uncontrolled erosion where Corps boundary lines are narrow may cause loss or inundation of private land (3).

The Garrison Diversion project, which will divert waters from Lake Sakakawea on the Missouri River for irrigation, may further deteriorate reservoir waters by the addition of runoff waters which contain a high

salt and nutrient load; irrigation waters will pass through lakes north of Lake Ashtabula which are now approximately two-thirds the salinity of sea water (11).

The only direct monitoring of water quality in Lake Ashtabula is done by the Environmental Protection Agency and by universities in association with various research studies (3). The NDS DH, however, takes monthly samples from the Sheyenne River just below Valley City and quarterly samples on Baldhill Creek for the measurement of physical, chemical, and biological (BOD, coliform) parameters. The U. S. Geological Survey also maintains a sample station on the Sheyenne River near Cooperstown where flow rates and other physical and chemical parameters are measured (11).

Although waters flowing into Lake Ashtabula have been deemed suitable for irrigation, the usage of reservoir waters for irrigation is preempted by allocations of the conservation pool (69,000 acre-feet) for municipal, industrial, and domestic purposes. Allocations were made to entities which assisted financially with dam construction and were based upon the amount contributed and/or the 1950 population (for municipalities) (13).

Before impoundment, the river was poisoned to help insure a carp-free reservoir. Subsequent stocking by the NDS GFD included Northern pike, walleye, small and largemouth bass, white bass, channel catfish, and bluegill; most stocked fish were reared in federal hatcheries (5, 14). Yellow perch currently provide a good forage base, with white bass becoming increasingly important, for carnivorous species such as walleye and Northern pike. Fishery production has generally been high although often sporadic (11). Both yellow perch and white bass currently were abundant in 1974 although possible overcrowding has resulted in size retardation (5). Good annual sport harvests of Northern pike have been

recorded and black and brown bulkhead catfish are removed by commercial fishermen. The NDSGFD tags approximately 1,000 to 1,500 fish (walleye and Northern pike) each spring in conjunction with USF&WS egg collection activities (5).

Walleye and Northern pike populations have suffered from a lack of natural reproduction (5, 14). Northern pike reproduction has been reduced by (1) cattle grazing and trampling of vegetated spawning areas, and (2) water level drawdowns which result in egg desiccation. Natural reproduction of walleye has been retarded by (1) a lack of spawning (rocky or gravelly) areas, and (2) poor water quality (turbidity, organic matter on the bottom).

During drawdowns when lake volume is reduced significantly, fish are often concentrated in oxygen deficient bottom waters resulting in fish kills (14). During severe drawdowns, waters in the upper reaches of the reservoir may be totally oxygen deficient (10, 11) and some oxygen depletions have occurred during the summer (5). The absence of significant discharges of reservoir bottom waters may somewhat enhance the oxygen deficit problem. Increasingly poor reservoir water quality, which may be further degraded by sewage lagoon operations at Sibley Village, appears to further threaten many sport fish populations (5). Additionally, many fish are lost from the reservoir through discharges (14).

3. Wildlife

Several species of waterfowl utilize the reservoir, including Snow and Canadian Geese, American Coots, Blue-winged Teal, Mallards, Pintails, and Gadwalls. The NDSGFD has established two waterfowl rest areas involving 800 acres of land and water. One rest area is located where the Griggs and Barnes County line crosses the reservoir and the second sanctuary is where Baldhill Creek enters the reservoir. Hunting is allowed on all project lands except the rest areas, recreation sites, and project operations area. The waterfowl rest areas are not closed to fishing (5).

Approximately 400 of the 1,419 acres licensed to the NDSGFD are covered by brush and woodland (Table D.10.3); grasslands constitute most of the remaining acreage (5). The NDSGFD is attempting to maintain native midplain grasses and establish woody tree cover in suitable areas for wildlife enhancement. Approximately 13.8 mi of fence have been constructed to prevent cattle grazing; however, trespass cattle are still a problem in certain areas and effective fences are difficult to maintain (5).

Upland habitats adjacent to the reservoir are utilized by game species such as white-tailed deer (especially in the Baldhill Creek area), jack and cottontail rabbits, red fox, Sharp-tailed Grouse, Ring-necked Pheasant, and Hungarian Partridge (5). Suitable lowland communities along the shoreline are inhabited by muskrat and beaver, and shelterbelts provide food, cover, and nesting habitat for small mammals and a wide diversity of passerine birds (11, 15, 16).

NDSGFD makes county payments on the outgranted acreage in lieu of taxes. These payments are equal to the prevailing tax rate applied to the assessed land value (5).

4. Other Land Uses

(a) Forestry

Trees are not common on Corps land and consequently there is no intensive forest management program at the reservoir. However, trees are desirable for wildlife cover, erosion protection, and shading at public and quasi-public recreation sites.

Approximately 156.2 acres of woody cover (tall trees, fruit-bearing shrubs, conifers) has been established in nine areas by the NDSGFD to provide wildlife food and cover as partial mitigation of wildlife losses incurred through project construction. Costs of trees, planting, initial fencing, and initial cultivation were assumed by the

Corps (5, 2). Additionally, the Corps, Barnes County Park Board, and concessioners have planted trees at numerous other sites to provide shade and protection for camping and picnicking activities (2).

(b) Agriculture and Grazing

There are currently no agriculture or grazing leases at Lake Ashtabula (Table D.10.6). Prior to 1966 there were 8 to 15 grazing leases involving 5 to 20 acres but these outgrants were discontinued to encourage restoration of native vegetation and to reduce erosion (2, 6).

(c) Rights of Way

There are 13 outgrants for rights of way across project lands (Table D.10.6). These outgrants range in duration from 2 years to indefinite and rental fees are charged on only two easements (most grants are to an electric cooperative). A summary of outgrants at Lake Ashtabula is presented in Table D.10.7.

5. Resource Use Controls

The Engineering and Construction-Operations Divisions, St. Paul Engineer District, are responsible for planning and management of the reservoir's resources. (Figure D.10.2). A real estate field office under direct jurisdiction of the North Central Division, has been established at the St. Paul District to supervise reservoir real estate programs and practices. Corps personnel indicated that responses to real estate questions are frequently delayed because of this jurisdictional relationship (3, 6).

Recreation resources at the project level were managed by Barnes County prior to 1965 (6). Corps project-level staff during this period were responsible for operation of reservoir water levels to meet primary project purposes and consisted of a dam tender and a temporary summer laborer (3). Staffing prior to 1965 was apparently inadequate to

Table D.10.6 Outgrants for Agriculture, Grazing, and Rights-of-Way, Lake Ashtabula.^a

Purpose	Grantee	Outgrants	Instrument	Rental Date	Term (yrs)	Annual Rent Paid (\$)	Acreage	Investment to 1974 (\$)	Planned Investment (\$)
Agriculture Summary	0								
Grazing Summary	0 ^b								
Rights-of-Way Summary	13	Easement ^c	1950-1974	2-Indef.	4 ^d	32.9 ^e	N/A ^f	N/A	N/A
Totals	13 ^g				4	32.9			

^a Personal communication, 15 November 1974. St. Paul District Real Estate Field Office (North Central Division), St. Paul, Minnesota.

^b Prior to 1966 there were 8-15 grazing leases involving 5-20 acres.

^c Two rights-of-way grants are licenses.

^d Rental fees are charged on only two outgrants.

^e Only four outgrants have designated acreage.

^f Not available.

^g There are approximately 40 special use licenses (for sheds, boat houses, water systems, etc.)

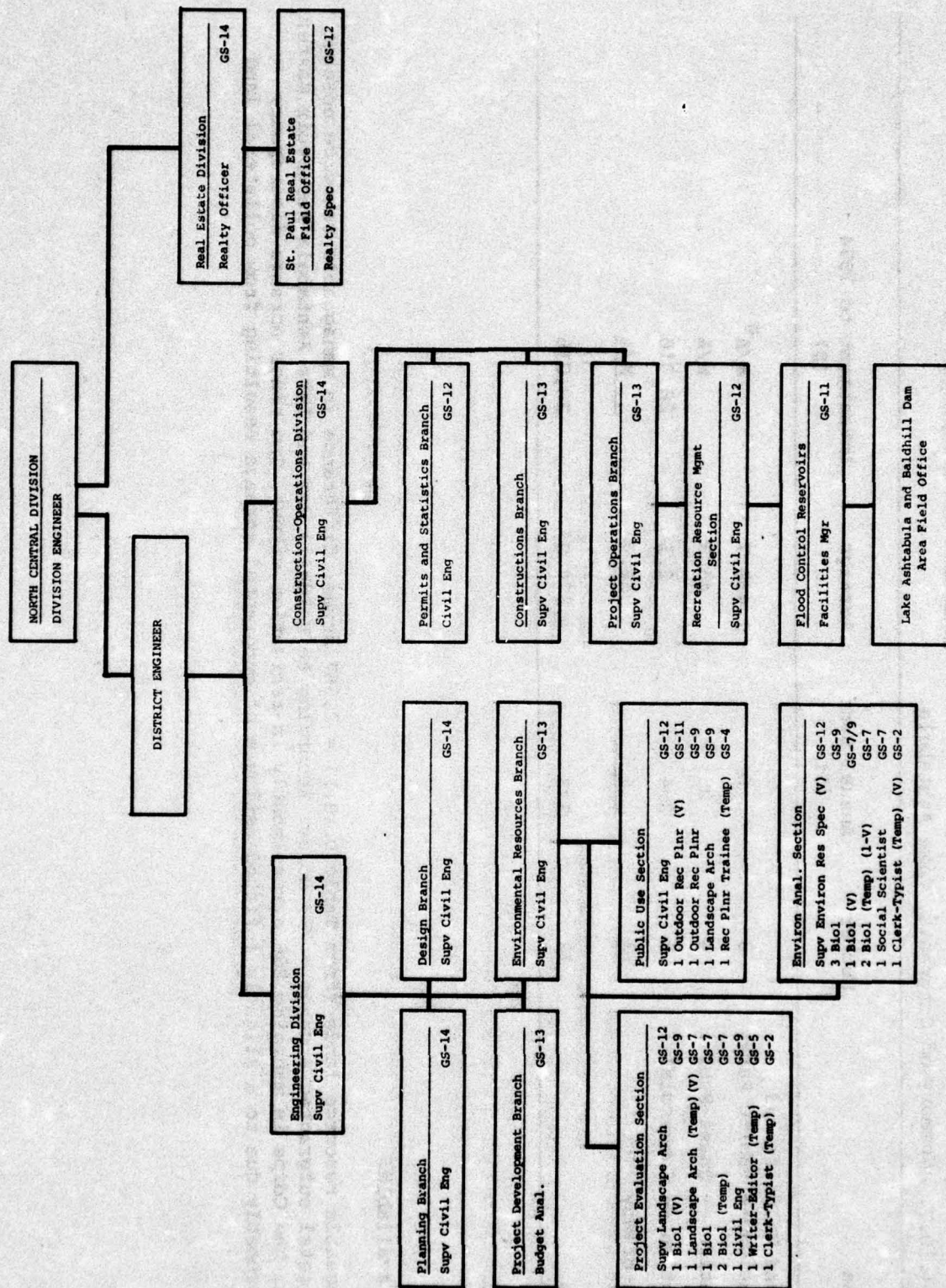
Table D.10.7. Summary of Outgrants, Lake Ashtabula.

Purpose	Number	Annual Rent (\$)	Acreage	Investment to 1974 (\$)
Fish and Wildlife and Recreation -- Public Parks	3	0	1,493.7	N/A ^a
Recreation -- Quasi-Public	4	25	45.3	N/A
Recreation -- Commercial	2	294	2.1	28,016
Rights-of-Way	<u>13</u>	<u>4</u>	<u>32.9</u>	<u>N/A</u>
Totals	22	323	1,574.0 ^b	28,016

^a Not available.

^b Manageable resource lands (from Table D.10.1) = 2,367 acres; difference in manageable resource acreage and total outgranted acreage = 793 acres. According to Baldhill Dam and Lake Ashtabula Reservoir Master Plan, the Corps is managing 806 acres (mostly in recreation sites). The minor acreage discrepancy is probably due to a slightly inflated estimate of outgranted acreage resulting from collateral land uses.

Figure D.10.2. Recreation-Resource Management Interrelationships - St. Paul Engineer District.



effectively administer and enforce Corps regulations. It was noted, for example, that nearly all private facility encroachment violations now existing were constructed during this period (3).

Corps project-level staffing was increased in 1965 when most reservoir recreation sites reverted to Corps operation (3). Full-time project-level staffing now includes a facilities manager, dam tender, and sewage disposal operator; during the summer eight temporary employees are hired, four of which are park technicians (6).

The facilities manager at Lake Ashtabula also has supervisory responsibilities at five other reservoirs in the St. Paul Engineer District. Administrative responsibilities during his necessary absence are imposed upon low-level personnel. The dam tender, grade WS-6, is the most qualified of these employees, but his assumption of resource management duties at Lake Ashtabula is sometimes prevented because he must also supervise water level management at another Corps reservoir (3, 6). The facilities manager indicated that management at the project level could be enhanced by the addition of professionally trained personnel such as park rangers.

III. KEY FINDINGS

A. Recreation

1. Land acquired above the normal recreation pool is generally not of sufficient width to permit development of diverse and extensive lake-based recreation facilities. Unsuitable topography and lack of trees are also limiting factors.

2. Most existing recreation facilities have been appropriately located, have adequate and controlled access, and are well-maintained. However, several recreation sites have been poorly designed and do not allow maximum utilization and realization of potential benefits.

3. Basic minimal recreation facilities were constructed by the Corps. Barnes County constructed complementary facilities and executed third party leases for commercial concessions. The county operated all recreation areas and administered all concessions until county appropriations for operation and maintenance became limited. The county then withdrew from all but two of the recreation areas forcing the Corps to accept administrative responsibility for the facilities and existing concession arrangements on the relinquished areas.

4. Development of new recreation sites will require cost-sharing. Inadequate funds presently limit the cost-sharing capabilities of Barnes County.

5. A day use recreation site leased by the Corps to the Village of Sibley reverted to Corps management in 1972 because of lack of village interest.

6. Although the lake receives significant winter recreational usage, the Corps' recreation program is not designed to accommodate such activities. Lack of a structured winter program prevents realization of the reservoir's maximum recreational potential and jeopardizes the quality of existing reservoir resources (from vandalism, misuse, etc.).

B. Fish and Wildlife

1. The reservoir is naturally productive and has not required an intensive sport fishery development program. However, reservoir draw-downs and grazing of the littoral zone by cattle have reduced natural spawning habitats for northern pike; additionally, walleye production has been retarded because of insufficient rock and gravel spawning areas.

2. Fishing is the second major recreational use of the reservoir and the estimated annual harvest in 1967 was 75 pounds per acre.

3. Wildlife management by NDSGFD has focused on allowing the land to return to indigenous vegetation and mitigate losses incurred during construction of the reservoir. Additionally, two waterfowl sanctuaries have been established. Cattle trespassing has hindered wildlife management practices in some areas.

C. Corps and Contiguous Land Use

1. Land use adjacent to the reservoir has remained agricultural (mostly grazing). Establishment of approximately 100 private cottages in nine locations has been the only significant change in land use related to reservoir formation. Nearly all cottages are in close proximity to the Corps boundary and most are used only during the summer recreation season; cottage upkeep varies from poor to excellent.

2. Encroachment of cottages, boat docks, storage sheds, septic tank drainage fields, and cattle onto Corps lands has been a major problem. Most facilities which encroach onto Corps land were constructed prior to 1965. The Corps has not taken action to eliminate these encroachments, but legitimizing special use permits and licenses have been issued to most violators.

3. Erosion and sedimentation caused by wave action and cattle grazing are also significant problems at the lake. The Corps is not attempting to control erosion except where recreation facilities or

other project structures are endangered. Uncontrolled erosion may cause loss or inundation of private land.

D. Real Estate Programs and Practices

1. No agricultural or grazing leases are currently active.
2. Granting leases to nonprofit organizations for recreational purposes has the potential of creating high social benefits. However, outgrants to such groups at Lake Ashtabula have frequently failed due to a reduction in group interest, improper management, or lack of funding. Of 18 leases granted, only four are currently active.

E. Corps Organization

1. The facilities manager at Lake Ashtabula has supervisory responsibilities at five other Corps reservoirs. Administrative responsibilities during his necessary absence are imposed on low-level personnel. The facilities manager indicated that management at the project level could be enhanced by the addition of professionally trained personnel such as park rangers.

2. The real estate office in the St. Paul District is under direct jurisdiction of the North Central Division. Problems and inquiries often must be relayed to the Chicago office causing delayed response and action at the project level.

F. Environmental Problems

1. Lake Ashtabula has a eutrophication problem resulting from the encroachment of free-ranging livestock and runoff of agricultural and cattle wastes, fertilizers, and municipal wastes into the reservoir and upstream waters. Unsightly blue-green algae blooms occur during the mid and late summer months, creating objectionable odors that adversely affect boating, swimming, and the aesthetic appearance of the lake.

2. A potential environmental problem at Lake Ashtabula is the construction of a two-cell waste treatment lagoon at Sibley. The lagoon is located on a moderately sloped valley wall in close proximity to the lake. If improperly constructed, wastes may leach into the lake. Additionally, this treatment plant may produce odors objectionable to Sibley residents and lake visitors.

3. The Garrison Diversion project may increase eutrophication and water salinity at Lake Ashtabula, thereby affecting the reservoir's water quality and fishery resources.

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11. LEECH LAKE AND DAM

North Central Division

St. Paul District

Minnesota

I. SETTING

A. Location

Leech Lake is located in Cass County in north central Minnesota about 30 miles (mi) southeast of Bemidji (1970 population: 11,490) and 50 mi north of Brainerd (1970 population: 11,667). The lake lies within the bounds of the Chippewa National Forest and partially within the Leech Lake Indian Reservation. The largest community on the lake is the Town of Walker with a population of 1,073. The only other lakeside community is Federal Dam with a population of 147.

MN 371, which runs in a north-south direction from Cass Lake to Little Falls through Walker on the west shore, and MN 200, which runs in an east-west direction from U. S. 2 to U. S. 71 along the south shore, are the major roads in the immediate vicinity of the lake. Cass 8 passes through Federal Dam on the eastern side of the lake. U. S. 2 which crosses the northern end of Cass County provides access to MN 371 at Cass Lake and to Cass 8 at Bena. Local accessibility is provided by a number of county improved and dirt roads. Some areas of the lake are difficult to reach, however, requiring the use of four-wheel drive vehicles (Figure D.11.1).

B. Authorization and Purposes

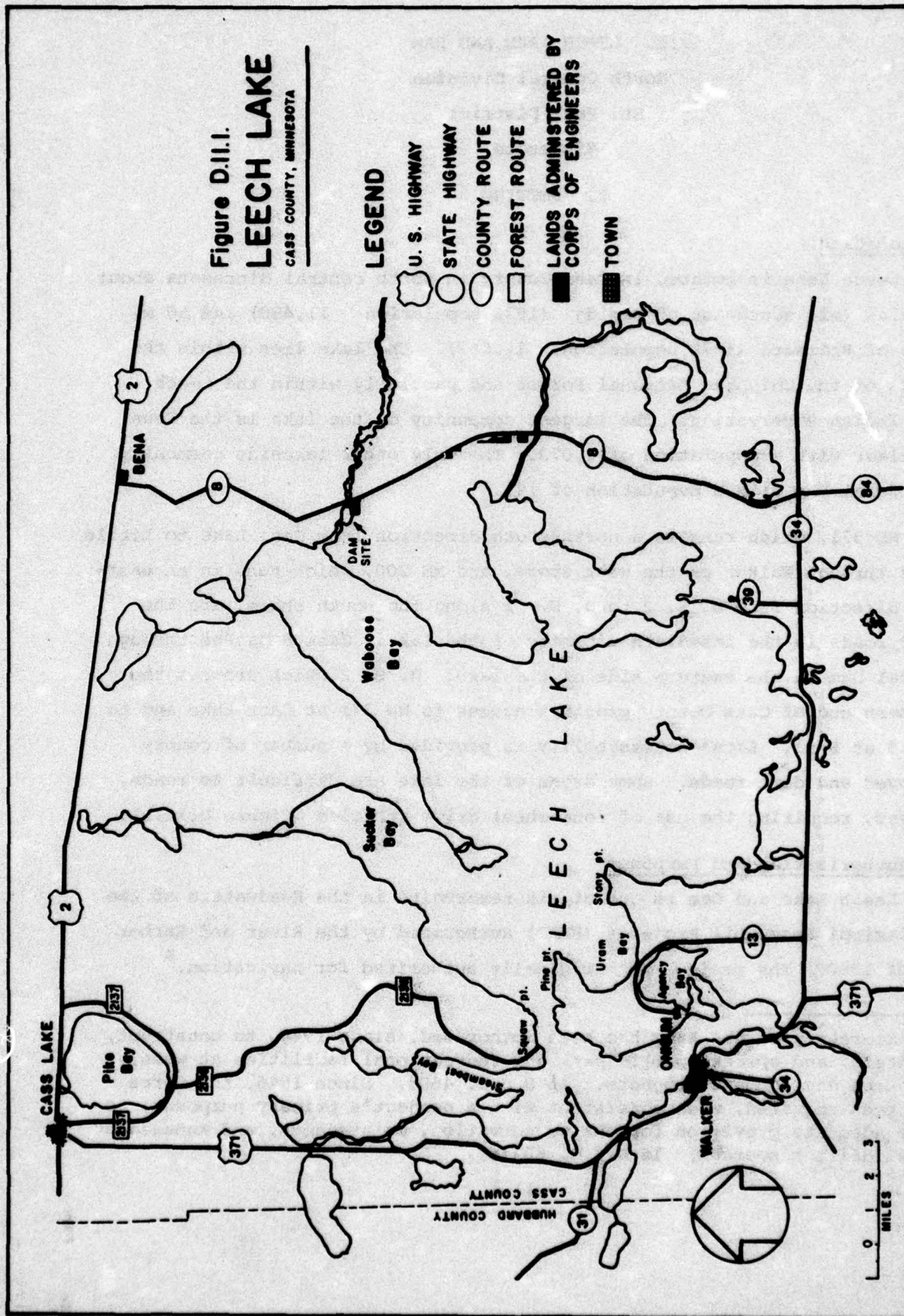
Leech Lake and Dam is one of six reservoirs in the Headwaters of the Mississippi Reservoir Projects (HMRP) authorized by the River and Harbor Act of 1880. The project was originally authorized for navigation.^a

^aThe Secretary of the Army has been authorized, since 1944, to construct, maintain, and operate public park and recreational facilities at water resource development projects. 16 U.S.C. 460d. Since 1946, the Corps has been required, when consistent with a project's primary purposes, to make adequate provision for the conservation, maintenance, and management of wildlife resources. 16 U.S.C. 663(a).

Figure D.III.1.
LEECH LAKE
 CASS COUNTY, MINNESOTA

LEGEND

- U. S. HIGHWAY
- STATE HIGHWAY
- COUNTY ROUTE
- FOREST ROUTE
- LANDS ADMINISTERED BY
CORPS OF ENGINEERS
- TOWN



Leech and five other natural lakes (Lake Winnibigoshish, authorized in 1880; Lake Pokegana, 1880; Sandy Lake, 1895; Pine River Lake, 1880; and Gull Lake, 1912) were dammed by the Corps to assist in controlling flows on the Mississippi River from St. Paul downstream to Lake Pepin for navigation purposes during summers when natural flows were insufficient. Today, locks and dams on the river make navigation possible as far north as Minneapolis-St. Paul, and there is little or no requirement for periodic release of water to insure navigable depths. Secondary purposes of Leech and its sister lakes are recreation, fishing, hunting, and wild rice harvesting (ricing).^a

C. Features

Leech Lake is the largest in the HMRP and one of the largest lakes in MN. Completed in 1884, the first dam at Leech Lake was wooden. The structure was replaced with a concrete dam in 1900 and further modifications were made in 1925 and 1957. Water fluctuation is normally very slight, no more than 1.5 feet (ft) since 1969. Normal pool elevation is 1,295.8 feet above mean sea level (ft msl). The maximum recorded was 1,299 ft msl in 1950 (1).

The drainage area of the lake is approximately 1,163 square miles. The runoff, and consequently the surface elevation, of approximately 14 natural lakes is controlled by the Leech Lake Dam. The water surface elevation is lowered during the late fall and early winter to provide storage for normal spring runoff (Table D.11.1).

The shoreline is irregular. The eastern and northern shores are low-lying and wet; accessibility is difficult. The western and southern

^aProject personnel cite current project purposes as: water level control, water supply, fish and wildlife conservation, recreation enhancement, water quality enhancement, and flood control. RRMS data continue to show navigation as the only authorized project purpose.

Table D.11.1. Resource Statistics, Leech Lake.^a

Date of Authorization	1880
Rights in Land Acquired Between	1881-1906, 1967
Date of Impoundment	Natural Lake
Date of Full Operation	July, 1892
Lake Size When Water Level is at:	
Spillway Elevation (1,297.9 ft msl)	151,500 acres
Normal Pool Elevation (1,295.8 ft msl)	126,400 acres ^b
Normal Minimum Pool Elevation (1,294.8 ft msl)	107,100 acres
Water Fluctuation - Summer Recreation Season	.4 feet
Shoreline at Normal Pool	51 miles ^{c,d}
Held in Fee Simple by Corps	1 mile
Land Area Manged by Corps	
Total Land in Project	100,892 acres
Fee Title in U. S.	156 acres
Easements	100,705 acres
Project Operation Lands	3 acres
Manageable Resource Lands	149 acres ^e

^aNorth Central Division, Real Estate Field Office, St. Paul, Minnesota.

^bThe Minnesota Department of Natural Resources indicates that there are 111,500 acres at normal pool elevation. The Center for Environmental Studies at Bemidji State College indicates that there are 126,486 acres of open waters in the reservoir and 111,526 acres of open water in the lake proper.

^cRRMS. 1973.

^dState figures indicate there are 316.5 miles of reservoir shoreline and 189.75 miles of open lake shoreline.

^eSt. Paul District. 1964. Master Plan for reservoir development, Leech Lake Reservoir. St. Paul, Minnesota. (Cannot be calculated from existing information.)

shores are high with sand and gravel beaches. There are many bays, chains of satellite lakes, and creeks connecting the lake with numerous other water bodies in the area.

Jack pine, aspen, birch, white pine, mixed hardwoods (oak, maple, elm, basswood) are found in the Leech Lake area. Several markets exist around Leech for timber sales and jack pine is in very high demand for pulp. Cutting is reserved along the lakeshore by the USFS.

Erosion from wind, water, and ice action is a problem in certain areas. The shoreline has been changed by both ice action and development. Protective mooring is often needed and this creates a desire on the part of private landowners and holders of shoreline permits to construct jetties, fixed piers, and other structures in the lake.

II. LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

A. Analytical Unit

The analytical area is roughly delineated by MN 371 and MN 200 on the west and south, respectively. On the east Cass 8 serves as the analytical unit limit as far north as Bena. As this point a line running in a southwesterly direction through the swampy holdings of the Minnesota Forest Service (MFS) and higher lands of USFS to the northern tip of Steamboat Bay serves as the northern boundary.

B. Ownership

Public ownership of land within the analytical unit has been conditioned by the fact that the lake was a natural body with established townsites and resource depletion problems before the Corps' navigation project. At present, within the analytical unit, it is estimated that the U. S. holds fee title to about 40% of the land; the State of MN holds title to 25%; Cass County holds 20%; the Leech Lake Band of the Minnesota Chippewa Tribe of Indians 4%; and about 10% is held privately. The Corps holds less than 1% (2).

1. Corps

The Corps holds fee title to 158 acres of land at the lake. Of this amount, 149 acres are located at Federal Dam at Cass 8 and on the eastern shore at Leech Lake River. The remaining acreage is situated in 2 parcels of 3.82 and 5.21 acres to the south on Cass 8. These lands are remnants of larger holdings of the Corps in years past. In 1958, the Corps disposed of its largest holdings through the U. S. General Services Administration which sold the lands at public auction. The Corps is in the process of transferring other fee lands in the HMRP to the USFS but the 2 small parcels are not involved (3).

2. Other Federal Agencies

The USFS holds a vast amount of land along the shores and in the immediate vicinity of Leech Lake. The holdings are in a checkerboard

pattern with many parcels touching the shoreline (2).

3. State Government

The Minnesota Department of Natural Resources (MDNR) holds lands in a checkerboard pattern interspersed among USFS holdings. MDNR lands are situated primarily on the north and eastern shores. Most holdings are low-lying and wet and difficult to reach by land. These lands were acquired under the authority of the Minnesota Swamp Management Act of 1910.

Battleground State Forest is located in the northeast quadrant of the analytical unit. Most of these lands are swampy.

The MDNR owns 70 cottage sites at Leech Lake. These are located on the northern, western, and southern shores (5).

4. County and Municipal

There are a number of parcels of land which belong to Cass County particularly to the north of the lake. These lands are the responsibility of the county land manager. Most of these lands were stripped of their forest resources and abandoned. The County acquired them when they became tax delinquent. County lands are interspersed among USFS and State-owned properties and there are a number of parcels bordering Leech Lake (6).

5. Private

Private properties are situated primarily along MN 200 and the southern shore and between MN 371 and Steamboat Bay.

6. Tribal

The Leech Lake Band of the Minnesota Chippewa Tribe holds several parcels of land within the analytical unit. The lake lies almost totally within the limits of the Indian Reservation (4).

C. Resource Management

1. Recreation

a. Corps

There is a 58-site campground owned and managed by the Corps at the damsite. The campground is normally crowded on the opening day of fishing, Memorial Day weekend, the Fourth of July weekend, Labor Day, and when there is warm dry weather. During the ricing season in the fall, the campsites are usually filled. Harvesting of wild rice normally takes place after Labor Day. Use during 1972 and 1973 is reported in Table D.11.2.

Table D.11.2. Public Use Data - Leech Lake Damsite

Statistic	1972 ^a	1973 ^a
Vehicles entering campground	16,712	17,755
Camping permits sold	1,216	N/A ^b
Boats launched	1,492	N/A
Fees collected	\$1,956	N/A

^aHeadwaters of the Mississippi Reservoir Project Office, 1974. Park manager's records. Remer, Minnesota.

^bNot available.

Visits are calculated on the basis of a 3.8 load factor. Field checks made during the 1973 camping season indicated that the actual count is between 2.8 and 3.4. The discrepancy was not explained. A visitation study is being conducted by the Construction Engineering Research Laboratory, Corps of Engineers, Champaign, Illinois. Data collected by 1974 indicate that total vehicles entering the campground is substantially higher than recorded in 1972 and 1973. Preliminary counts indicated that 56,000 cars crossed traffic visitation counters

between 11 May and 31 October 1973 (8). Records indicating visitor origins were not made available.

Other 1973 information from the HMRP offices indicate the following use statistics for the campground: pickup truck campers 50%, tents 25%, foldout tent trailers 10%, travel trailers 10%, motor homes 5%. Of boats launched at concession sites, 25% were 10 to 15 ft and 75% were 16 to 25 ft (8).

The Corps' campground is served by sealed vault sanitary facilities. Liquid wastes pumped from the vaults are disposed of through septic tanks and drain field systems serving other Corps service and residential facilities.

The St. Paul District is considering the possibility of constructing a sewage treatment system for the Federal Dam Campground during 1975. Included in the planning study is the possibility of providing an electrical outlet to each of the campsites (8).

The Corps is permitted to dump solid waste collected from the public use area in an approved sanitary land fill operated by the Village of Federal Dam. The Corps pays the Village \$100 per year for this service (1).

Sewage dumping facilities are available in the campground area. The dumping station is used, however, by the general public. Use is not discouraged although waste removal becomes more frequent (1).

There are 6 recreation concessions at the damsite (Table D.11.3). The concession leases are issued on a 5-year basis. Rentals for five are \$250 per year; for one the fee is \$100. The concessioners rent boats and provide boat launching facilities and fishing guide services. Each of the operations also has snack and sandwich service.

Table D.11.3. Outgrants for Recreation -- Commercial, Leech Lake.^a

Grantee	Instrument	Rental		Annual Rent Paid (\$)	Acreage	Investment		Turnovers
		Date	Term (yrs)			To 1974 (\$)	Planned (\$)	
E. Brayfogle	Lease	1973	5	240	0.45	N/A ^b	N/A	0
W. Bridge	Lease	1971	5	240	0.45	N/A	N/A	1
R. Gifford	Lease	1971	5	240	0.45	N/A	N/A	0
Neuer Bros.	Lease	1971	5	240	0.45	N/A	N/A	1
R. C. Neuer	Lease	1972	5	100	0.50	N/A	N/A	1
C. Westcott	Lease	1971	5	240	0.45	N/A	N/A	1
Totals	6			1,300	2.75			4

^aPersonal communication, August - October 1974. North Central Division, Real Estate Field Office, St. Paul, Minnesota.

^bN/A means Not Available.

The buildings are old and in need of maintenance. Slit trench toilets are provided behind the buildings (3).

b. U. S. Forest Service

The USFS operates a campground with 44 sites at Stony Point. This public use area also includes a picnic area, beach, 2 harbors, and a boat launching ramp. The facility is used heavily during warm, dry weather. Campsites are filled on holiday weekends.

To the south of Stony Point Park, the USFS leases a number of summer homes to private individuals. Homes are also available at Onigum Point and Uran Bay.

The USFS maintains two canoe routes. One runs from Inguadoana Lake to Leech Lake (23 mi) and the other runs from Anoway Lake to Agency Narrows and Bay (10 mi). Stop-over areas for camping and rest are provided along the routes by the USFS. The USFS landscape plans indicate that 25% of its holdings along the shore will be maintained as natural areas (2, 9).

c. Tribal

The Leech Lake Band of the Minnesota Chippewa Tribe operates a commercial marina and a campground on Onigum Point. The concession includes boat sales and service, a gifts and crafts shop, a restaurant and lodge, grocery sales, and other services. Tribal lands just north of the marina were leased for recreational use up until 1974. This practice ceased abruptly in accordance with a policy change of the Leech Lake Reservation Business Council and leases were cancelled. Some mobile homes still remain on the lease sites. No explanation was given as to why leasing had been stopped (4).

d. Walker

Walker maintains two facilities along the western shore.

On the south side of the community a large multipurpose community park contains camping and picnicking, a meeting hall, ball fields, pavilions, boat launching facilities, and an observation peninsula. The park is located at a sewage treatment facility.

At the center of town, a municipal pier and harbor have been constructed. The facility contains a refreshment concession and a boat sales and service establishment (7).

2. Lake Resources

The winter drawdown and spring filling of Leech Lake is apparently suitable for fishery production. Summer water level fluctuations of only 0.4 ft assure that eggs will not be desicated and result in good hatches of walleye, Northern pike, and muskellunge. The lake is famous for its annual musky tournaments and fish between 60 and 80 pounds have been caught.

Current water management also benefits the spawning of important forage fishes. At many shoreline sites, wave action has removed the gravel leaving boulders which resist erosion and offer excellent walleye spawning strata. Although brown bullheads exist and are taken commercially by the Indians exclusively, they present no fish management problems. Suckers are also caught for human consumption (10).

Major fishery production has not significantly deteriorated as indicated by numerous state studies (tagging, creel census, exploitation). An estimated 40% of the sports fishermen are nonresidents. Fish houses are rented in the winter from concessioners for ice fishing and bait and road clearing services are generally covered by the rental fees (10, 11).

Leech Lake water quality was reported fairly good, suffering no problems of eutrophication. The water has apparently not changed

significantly from its natural state and contains humic stains from nearby bogs (12, 13).

3. Wildlife

No specific state waterfowl management practices (other than surveys) are conducted on Leech Lake although several species of waterfowl use the lake (Mallards, Redheads, Blue-winged Teal, Ring-necks, Golden-eyes, Canvasbacks, Wood Ducks and a large number of mergansers). Some deer management practices are conducted by the state within a few miles of the lake. Ah Gwah Ching is a small game management area just southwest of Leech where the maintenance of wildlife openings and timber cutting practices are used to enhance deer and duck habitat (10, 12).

The state does not feel that it needs an extensive wildlife management program at Leech Lake since the USFS administers a management program for wildlife habitat. According to the state, mostly local hunters use the Leech area but some sportsmen do come from more distant areas particularly Minneapolis and St. Paul (10).

The Chippewa Tribe controls hunting and fishing privileges at Leech Lake. In addition to a valid MN hunting and fishing license, non-Indians are required to pay a \$1 reservation fee for the privilege of hunting and fishing within the Indian reservation. The additional reservation fee has been in effect for 2 years and permitting is administered by Leech Lake Reservation Conservation Commission at Cass Lake. In addition to game and fishing fees, the Indians collect a \$3 fee per year for ricing from residents within the reservation boundaries and \$7 from nonreservation residents. The state does not collect fees on the reservation, however, residents who rice off the reservation must pay state fees. Receipts from fees go into the Leech Lake Reservation Business Council general fund earmarked for wildlife, fisheries, and rice management. To date no wildlife management activities have

taken place. Plans for the expenditure of those monies are incomplete (4).

4. Other Land Uses

About 80% of the shoreline is undeveloped. Beyond the municipal limits of Walker most developed land is utilized for private resorts and summer homes, and public recreation. Resorts are most dominant along the southern shore where there is high, dry land. Other instances of resort development occur to the east of Steamboat Bay and at Pine, Stony, and Sugar Points. Summer homes are located at Steamboat, Sucker, and Waboose Bays (4).

There are very few privately-owned vacant tracts left that are suitable for development along the shoreline. Nearly all developable parcels have been sold and developed. The remaining tracts for sale are marginal homesites at best; they tend to be low-lying and wet and unable to facilitate wells and septic tanks. Some developers are assembling large tracts of land for subdivision, generally to the south of MN 200 (14).

Quality of existing resort development varies from well-maintained, "modern facilities"^a to unkempt accommodations with the bare necessities. There are both year-round and seasonal resorts at the lake.

Residential and commercial development away from the shore is sparse. Structures tend to be located along county- and state-maintained roads.

Outgrants other than to commercial recreation concessions are issued in the form of easements, licenses, and leases for road rights-of-way to Cass County, power and telephone lines, a security light, and

^a Accomodations with heat, running water, toilets, and baths.

a parking lot. All are in the vicinity of Federal Dam (Table D.11.4).

The amount of land outgranted by the Corps at Leech Lake amounts to 21 acres or 13% of the 158 acres held in fee simple title (Table D.11.5).

5. Resource Use Controls

Waters within the HMRP are considered navigable waters of the U. S. As such, Leech Lake is subject to the provisions of the River and Harbor Act of 1899. Applications for modifications through dredging or construction are processed by the Permit Section, Engineering Division of the St. Paul District. At Leech Lake permits are required for shore modification and dock construction.

Corps shoreline plans are intended to assist in making more uniform decisions to approve or reject such applications and to enhance decisions pertaining to the use of those lands subject to high water flowage. The St. Paul District plans to complete a lakeshore management plan for Leech Lake in 1975 (15).

The USFS requires prior submission and approval of plans for construction of improvements on leased lands. They have completed a landscape protection plan for USFS shoreline holdings at Leech Lake (2).

All lakes in MN are classified as public or private bodies. Leech Lake is a public body. Therefore, the submerged land and resources are vested in the people of the State of MN. Plans for the use or modification of the submerged lands and resources are subject to approval or denial by MDNR.

The Minnesota Shoreland Management Act of 1971 is a mandate to guide shoreline development on public waters. The purpose of the Act is to prevent lake pollution and to maintain an aesthetically pleasing

Table D.11.4. Outgrants for Rights-of-Way and Miscellaneous Purposes, Leech Lake.^a

Purpose	Grantee	Instrument	Rental		Annual Rent Paid (\$)	Acreage	Investment	
			Date	Term (yrs)			To 1974 (\$)	Planned (\$)
Street or Road	Cass County	Easement	Perpetual		0	2.10	N/A ^b	N/A
Street or Road	Cass County	Easement	Perpetual		0	0.27	N/A	N/A
Street or Road	Cass County	Easement	Perpetual		0	15.33	N/A	N/A
Power Line		License	Perpetual		0	-----	N/A	N/A
Telephone Line		License	Perpetual		0	0.50	N/A	N/A
Security Light		License	Perpetual		0	-----	N/A	N/A
Parking Lot	Neuer Brothers	Lease	5 years		240	0.50	N/A	N/A
Totals		<u>7</u>			<u>240</u>	<u>18.70</u>		

^a Personal communication, August-October 1974. Northern Central Division, Real Estate Division, Real Estate Field Office, St. Paul, Minnesota.

^b Not available.

Table D.11.5. Summary of Outgrants, Leech Lake.

Purpose	Number	Annual Rent (\$)	Acreage	Investment to 1974 (\$)
Recreation -- Commercial	6	1,300	2.75	N/A ^a
Rights-of-Way and Miscellaneous Purposes	<u>7</u>	<u>240</u>	<u>18.70</u>	N/A
Totals	13	1,540	21.45	

^a Not available.

environment. MN's policy is to maintain natural shoreline conditions and cluster development is supported and promoted. MN has established 4 lake classifications: (a) natural environment, (b) recreational development, (c) general development, and (d) critical (16). Leech Lake is classified as a general development lake. Buildings must be set back from the lakeshore at least 75 ft; minimum lot size for wells and septic tank systems is 20,000 square ft; minimum lot width is 100 ft (5, 16).

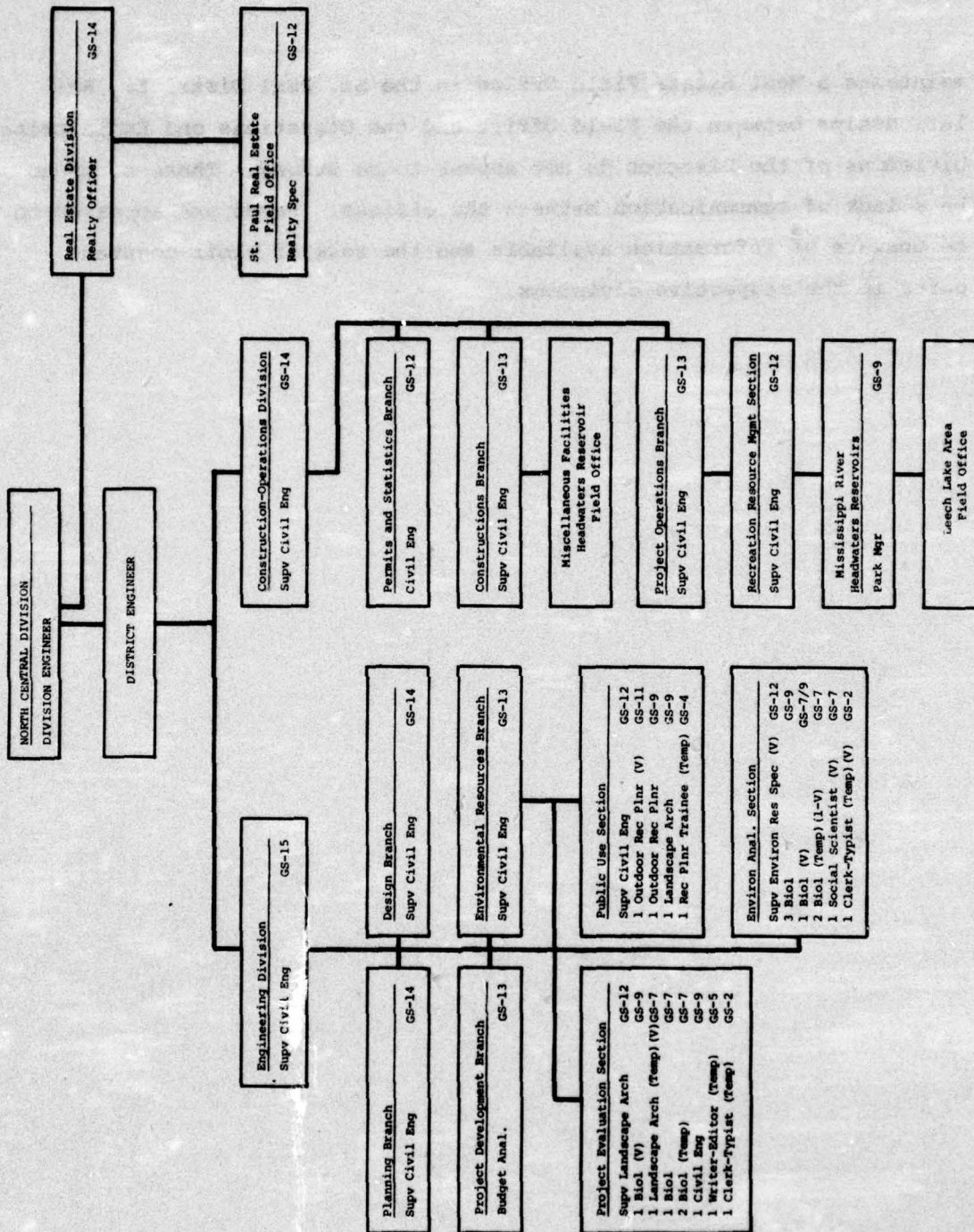
Cass County has an active planning and zoning board but it does not have a professional staff. The County adopted its present zoning ordinance in October 1972. The purpose of the ordinance is to provide for regulation of land development up to 0.25 mi beyond the high water mark of all lakes in the county. The zoning ordinance has been developed in accord with Minnesota Department of Health regulations governing individual sewage disposal systems. The minimum sewage or sanitary set back from normal high lake level is 100 ft. Both Cass County and Walker administer subdivision regulations that require building permits for new developments (7, 17).

At least three separate approvals are necessary before an owner or lessee can build a dock. Often the requirements are disregarded by the owners simply because the chore of seeking approval from three authorities during short vacation time spent at the lake is onerous (8).

The project staff for Leech Lake is limited to 3 persons--the park manager and a laborer located at Remer and the dam operator located at Federal Dam. During the summer temporary employees are hired including: one maintenance man, three laborers, and one park technician (Figure D.11.2

The Real Estate Division of the North Central Division (Chicago)

FIGURE 2.11.2. Recreation-Resource Management Interrelationships - St. Paul Engineer District.



maintains a Real Estate Field Office in the St. Paul District. Relationships between the Field Office and the Operations and Engineering Divisions of the District do not appear to be strong. There seems to be a lack of communication between the offices. Personnel appeared to be unaware of information available and the role of their counterparts in the respective divisions.

III. KEY FINDINGS

A. Recreation

1. Corps-operated recreation facilities are limited to a 58 site campground at the damsite. This well situated park is filled on the opening day of fishing; Memorial, Independence, and Labor Day weekends; and during dry and warm weekends in the fall when wild rice is gathered. Campers are turned away when all sites are occupied.

2. Use of the sewage dumping station at the campground is not limited to those occupying Corps campsites. The station is well known in the area and easily accessible to the public. Such use has not been discouraged although waste removal becomes a continually more frequent task.

3. During the summertime, students (temporary park technicians) are hired to manage the campground under the supervision of the dam-tender.

4. Six recreation-oriented commercial concessions are at the damsite and along the entrance-way to the campground. They offer boat launching services, boat and motor rentals; fishing guide service; fishing tackle, bait, snacks and sandwich sales. Concession structures are poorly maintained and the grounds are unkempt. Vault-type toilets are located behind each of the identically designed buildings.

5. The MDNR leases 70 cottage sites on the lake at \$25 per year for 10-year terms.

6. The USFS operates a campground and day-use facility at Stony Point where there are 44 campsites, a boat launching ramp, picnic

tables, a swimming beach, and two boat harbors run by concessioners. Two canoe routes are maintained by the USFS. One runs for 23 mi from Inguadoana Lake to Leech Lake; the other runs approximately 10 mi from Anoway Lake to Leech Lake via Shingobee River.

7. In and around Onigum, the Leech Lake Band of the Minnesota Chippewa Tribe operates a campground, beach, and a commercial marina and lodge with eating facilities and a gift shop. The Tribe terminated leases for summer homes in 1974 because of a policy change of the Leech Lake Reservation Business Council. No further explanation was given.

8. The Village of Walker operates a recreation park along the shore of Leech Lake. Camping, picnicking, group meeting, and sightseeing facilities are offered. Boat launching facilities, boat and motor sales and repair, boat rentals, boat slips, and refreshment concessions are provided at a dock maintained by Walker. The cluster of facilities is orderly, well maintained and designed, and aesthetically pleasing.

B. Fish and Wildlife

1. Fishing at Leech Lake is excellent; bass, Northern pike, walleye, and muskellunge are abundant. The annual musky tournament attracts national attention; winning catches weigh 60 pounds or more.

2. In order to fish and hunt at Leech Lake, one must purchase a \$1 special permit in addition to the normal state license. Non Indians residing within the reservation must obtain a \$3 permit and all others a \$7 permit to gather wild rice at Leech Lake. The state waives the wild rice license that is required to gather the grain elsewhere in Minnesota.

3. Monies received from hunting, fishing, and wild rice permit sales go into the general fund of the Leech Lake Reservation Business Council, from which the Council appropriates funds to support tribal

wildlife, fisheries, and rice culture management at the lake.

4. Swamplands and extensive areas of shallow water marsh which support wild rice constitute ideal habitat to support large populations of nesting and migrating waterfowl.

C. Corps and Contiguous Land Use

1. Less than 1% of the shoreline is owned in fee simple by the Corps. Six commercial concessions, the damtender's residence and maintenance garage, a launching ramp, and a campground are located on 149 acres of Corps land at the damsite. Most of the property is in dense woodland.

2. Shoreline is owned and used by: the USFS (40%), the State (25%), Cass County (20%), the Minnesota Chippewa Tribe (4%), and private owners (10%).

3. Most of the privately owned land is on the western and southern shore which rises sharply 5 to 10 ft above the normal lake level. Cottages and small summer resorts have been built on lots bordering the lake during the 80 years which Leech Lake has been a popular summer retreat. Paved and gravel county roads extending north from MN 200 give access to most of the cottage resort areas. Unsurfaced county roads and rough, privately maintained roads are cut through the woods to private shorefront lands at several other sites.

4. The condition of most summer cottages is poor due to age, cheap construction, and the ravages of long severe winters. Resorts range from make-shift and low quality houses with minimum facilities to well-maintained, clean and good quality accommodations. No serious land-use problems were observed at Leech Lake, although the USFS officers reported that developers are assembling properties adjacent to the south shore and that a surge in development is possible.

5. Cass County has enacted state-approved zoning and subdivision regulations within 0.25 mi of the high water mark on the lakeshore. These regulations have been in force for 4 years but the county has not initiated legal action against violators. The county zoning staff in Walker consists of a director and an assistant. They rely upon volunteers to report infractions.

6. Cass County holdings are the responsibility of the County Land Manager's Office in Walker. Most of these lands had been clearcut and abandoned by their owners and were acquired when liens for delinquent taxes were foreclosed.

7. Much of the state-owned land is low-lying and wet. The state laid claim to the title of all such fragile wetland under the provisions of the Swamp Act of 1910.

D. Real Estate Programs and Practices

1. Income from six commercial concessions on 2.75 acres under 5-year leases amounts to \$1,300 per year. Corps inspection appeared lax and concessions were poorly maintained and unkempt. All six concessions serve the same area.

2. Under Section 10 of the River and Harbor Act of 1899, the Corps must approve proposals for constructing docks in the navigable waters of the U. S. before work can begin. Since the State of MN has title to the submerged land below the meander line of the lake, a permit from MDNR is required before any structure may be placed on submerged land. In addition, the USFS requires that its lessees secure permits before works can be built into the lake. Cass County also requires that zoning standards be met. Thus, at least three separate approvals are necessary before an owner or lessee can build a dock. Often the requirements are disregarded by the owners simply

because the chore of seeking approval from three authorities during the short vacation time spent at the lake is onerous.

E. Corps Organization

1. The administrative staff for the six-lake HMRP, headquartered in Remer about 30 mi to the southeast of Federal Dam, consists of a parks manager, a laborer and a clerk/typist. Each lake has a resident dam operator. Temporary help is hired during the summer to assist in the operation of the campgrounds at the damsites. The damtender at Leech Lake is responsible for campground operation and maintenance.

2. The Real Estate Division of the North Central Division (Chicago) maintains a Real Estate Field Office in the St. Paul District. Relationships between the Field Office and the Operations and Engineering Divisions of the District do not appear to be strong. There seems to be a lack of communications between the offices.

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12. PEND OREILLE LAKE (ALBENI FALLS DAM)

North Pacific Division

Seattle District

Idaho

I. SETTING

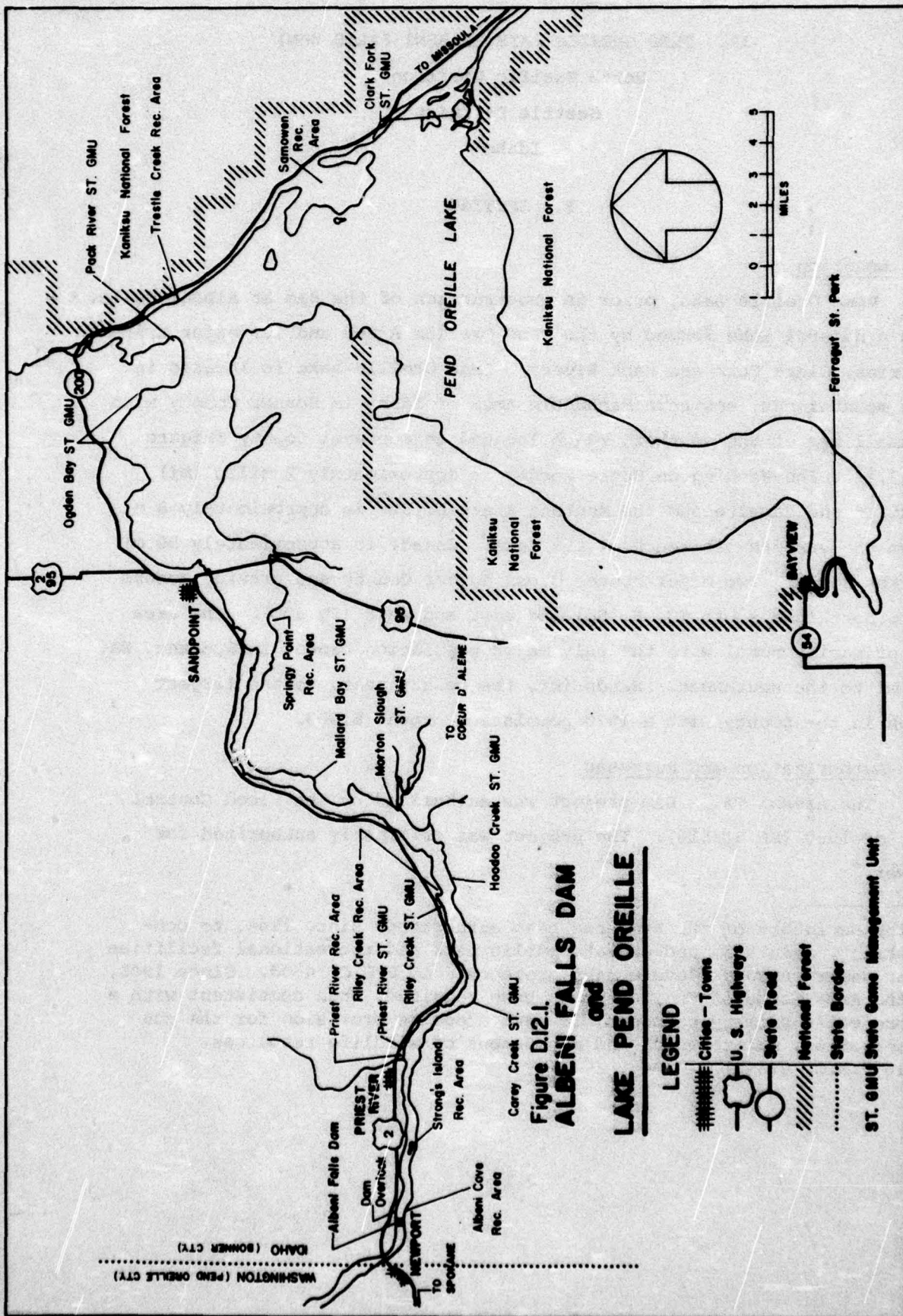
A. Location

Pend Oreille Lake, prior to construction of the dam at Albeni Falls, was a natural lake formed by the Pend Oreille River and its major tributaries, Clark Fork and Pack Rivers. Pend Oreille Lake is located in the mountainous, northern Panhandle area of Idaho in Bonner County with a small arm of the southern reach located in Kootenai County (Figure D.12.1). The Washington State border is approximately 2 miles (mi) west of the damsite and the Montana State border is approximately 8 mi from the easternmost reach of the lake. Canada is approximately 50 mi to the north. Two major routes cross Bonner County and provide access from north and south (U. S. 95) and east and west (ID 200). The area is primarily rural with the only major population center in Spokane, WA, 55 mi to the southwest. Sandpoint, the county seat, is the largest town in the county with a 1970 population around 6,000.

B. Authorization and Purposes

The Albeni Falls Dam project was authorized by the Flood Control Act of 1950 (PL 81-516). The project was originally authorized for power.^a

^a The Secretary of the Army has been authorized, since 1944, to construct, maintain, and operate public park and recreational facilities at water resource development projects. 16 U.S.C. 460d. Since 1946, the Army Corps of Engineers has been required, when consistent with a project's primary purposes, to make adequate provision for the conservation, maintenance, and management of wildlife resources. 16 U.S.C. 663(a).



C. Features

The streamflow in the Pend Oreille River, as well as the Clark Fork, follows a regular pattern. Low flows occur from late summer through March, after which the stream begins to rise cresting in May or June. The water recedes at a uniform rate until normal low-water is reached in August or September. With the operation of the dam at Albeni Falls, normal full pool is at elevation 2,062 feet mean sea level (ft msl) (1). The stored water is released beginning in September and is drawn down to elevation 2,051 ft msl by November, where some fluctuations occur; the pool is gradually raised to normal elevation (2,062.5 ft msl) by mid-April (2). Drawdown times and rates are regulated to produce maximum power, as needed, and are controlled jointly by the North Pacific Division and the Bonneville Power Authority (2).

Prior to operation of the dam, the average annual range in water levels for the 10-year period 1938 to 1947 was 9 ft, while the extreme annual fluctuation for the period 1914 to 1947 was 21.4 ft (1). Annual drawdowns in conjunction with the current dam operation are around 10 to 12 ft. Additional resource statistics are presented in Table D.12.1.

Table D.12.1. Resource Statistics, Pend Oreille Lake.

Date of Authorization	1950 ^a
Rights in Land Acquired Between	1950-1954 ^b
Date of Impoundment	June, 1952 ^c
Date of Full Operation	August, 1955 ^a
Lake Size When Water Level is at:	
Spillway Elevation	N/A ^d
Normal Pool Elevation (2062.5 ft msl)	94,600 acres ^a
Normal Minimum Pool Elevation (2051 ft msl)	88,300 acres ^a
Minimum Design Elevation	N/A
Water Fluctuation - Summer Recreation Season	10 ft ^a
Shoreline at Normal Pool	226 miles ^c
Held in Fee Simple by Corps	42 miles ^c
Land Area Managed by Corps	
Total Land in Project	113,182 acres ^c
Fee Title in U. S.	4,215 acres ^e
Easements	9,228 acres ^e
Transfer of Public Domain	5,140 acres ^e
Project Operations Lands	145 acres ^e
Manageable Resource Lands	-- ^f

^aU. S. Department of the Interior, Fish and Wildlife Service. 1953. An interim report on the fish and wildlife resources affected by the Albeni Falls project, Pend Oreille River, Idaho. Washington, D. C.

^bPersonal communication. 14 November 1974. Seattle District, Real Estate Division, Seattle, Washington.

^cRRMS. 1973.

^dNot available.

^eSeattle District, Real Estate Division. 1974. Memorandum: real estate review, Albeni Falls Dam project. Seattle, Washington.

^fCannot be calculated on the basis of existing information.

II. LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

A. Analytical Unit

Pend Oreille Lake exerts considerable influence immediately around the lake in terms of tourism, commercial and sport fishing, and primary and secondary housing. Such influence existed prior to construction of the Albeni Falls Dam but recently the area has come to depend economically on retail and tourist services. The lake is complementary to other visitor-drawing resources activities (snow skiing, national forests) and is now part of a year-round resort area. Dozens of brochures, particularly for the town of Sandpoint, ID, highlight activities provided by the lake and surrounding area. Fishing is the major attraction to Pend Oreille Lake but boating, hunting, and water skiing are also popular.

The attractions of fishing and more recently snow skiing have increased significantly the number of non-resident visitors and the distances they travel. A majority of the returning anglers and vacationers are from the Spokane, WA area (SMSA population 287,487) as well as from Canada. The annual Kamloop and Kokanee Fishing Day and associated festival in May also draws people from a large area. The development of the Schweitzer Basin, 4 mi northwest of Sandpoint, as a ski resort area has added significantly to the area's year-round attractiveness.

Pend Oreille Lake has long been known for its fishery resources. Prior to World War II, Pend Oreille was known primarily for its white-fish commercial fishery, and in the mid-fifties sport fishing also became widespread on the lake.

Numerous other economic benefits are derived from the lake. The lake was used in the transportation of logs from camps upstream to mills and loading points downstream on the Pend Oreille River. Logging is the area's single biggest industry although in recent years the in-

dustry has declined. Agriculture, particularly on the rich bottomlands around the lake, is also an important income producer. Additionally, Pend Oreille Lake was one of the few inland lakes in the western U. S. which supported a commercial fishery (1).

Generally, tourism, logging, and agriculture constitute the majority of the economic base, although mining activities also contribute to the local economy. Governmental agencies employ approximately 18% of the working population in Bonner County and the USFS is the major employer (3).

Over 58% of the shoreline at Pend Oreille Lake is privately owned (3) and considerable permanent and summer home development is evident. The availability of waterfront property has attracted buyers from throughout the Pacific Northwest.

B. Ownership

1. Corps

The Corps has fee simple ownership of only 11.2% of the shoreline of Pend Oreille Lake (3). The total project area, as reported in RRMS 1973, is 113,182 acres. Corps lands total 18,582 acres of which the Corps has fee simple to 4,215 acres, 9,228 acres of lesser interests, and 5,140 acres by transfer of public domain (4). A flowage easement, which includes approximately 9,215 acres (5), is held on land 5 ft above the normal pool elevation of 2,062 ft (5). Approximately 4,824 acres of Corps land are outgrants (Table D.12.2).

The Corps has fee ownership for 42 of the 226 shoreline mi of Pend Oreille Lake (5). The draft of a 1974 Corps report entitled "Inventory of Resources, Management and Development Constraints" reports a shoreline ownership of 25 mi (3). The difference appears significant as the Corps shoreline ownership is embodied in several individual tracts of land throughout the length of the lake.

Table D.12.2. Summary of Outgrants, Albeni Falls Dam.

Purpose	Number	Annual Rent Paid (\$)	Acreage	Investment to 1974 (\$)
Fish and Wildlife	1	0	3,780	N/A ^a
Rights-of-Way and Other	13	0 ^b	44	N/A
Totals	14	0	4,824	

^a Not available.

^b Not totaled because rent is for the term of the lease.

2. Other Federal Agencies

The main body of Pend Oreille Lake, extending from Clark Fork River southward, is within the boundary of Kaniksu National Forest. In terms of Pend Oreille shoreline, 29 mi (12.8%) are owned by the USFS (3). A large portion of Bonner County, and Boundary County to the north, is also within the Kaniksu National Forest, some as isolated parcels.

The BLM owns isolated parcels of land in Bonner County, but no ownership of shoreland has been indicated with the exception of some areas around the Pack River and Clark Fork confluences (3).

3. State Government

The State of ID owns isolated parcels of land in Bonner County and the surrounding area. The Idaho Parks and Recreation Department (IPRD) has 1,402 total acres in the county and the Idaho Department of Lands (IDL) has 4,254 total acres which are indicated as recreation areas (7). In total, the state has ownership to 1.5% of the shoreline of Pend Oreille Lake (3).

4. Municipal

The City of Sandpoint owns 0.5 mi of shoreline of Pend Oreille Lake (3) and a portion of the area has been developed as a municipal park.

5. Private

Of the 226 mi of shoreline at Pend Oreille Lake, approximately 133 (58.8%) is in private ownership (3). Year-round residences are increasing on these private lands. The most concentrated area of permanent residential and second homes is at Bayview, on the extreme south end of the lake in Kootenai County, adjacent to the Farragut State Park area. Areas of additional residential concentration are located around Garfield Bay, Bottle Bay, and the towns of Glengary,

Cedar Creek, Granite, Hope, and Trestle Creek (3). Considerable housing development abuts the shore and upland area across the lake southeast from Sandpoint. Several miles of shoreline roads have been constructed since the late 1950's. A low-rise condominium is under construction on the lake front a few miles southwest of Sandpoint.

C. Resource Management

1. Recreation

Recreational sites and activities are abundant around Pend Oreille Lake and adjacent area. Although the inventory contained in the 1973 Idaho Outdoor Recreation Plan indicates the Corps has no facilities at Pend Oreille Lake (7), the Corps does operate and maintain seven sites which include a vista house and picnic area at the damsite. All but one of these recreation sites are within the western reach of the lake where the average width of the lake is less than 1 mi. Total land acreage for the seven sites is 153, of which 124 acres are developed (4).

The recreation sites were primarily access points until the adoption of the 1964 Master Plan which called for recreation development of the sites (2). The Corps is currently updating this Master Plan.

The recreation sites include Albeni Cove, Riley Creek, Springy Point, Priest River, Strong's Island, and Trestle Creek. There are 139 camping sites available, and the Riley Creek, Priest River, and Springy Point sites have been developed for camping trailers (126 campsites). These sites also have flush-type toilets, flushing stations for camping trailers, and centralized water systems. Fees are charged at these sites (class B camping) and total fees collected in 1973 were \$5,251 (5). All sites have parking and swimming beaches except Strong's Island and Trestle Creek. Vault-type toilets are available at all remaining sites except Trestle Creek (4).

All sites are considered fully developed except Strong's Island and Trestle Creek. Strong's Island is accessible only by boat and is minimally used - RRMS reporting the 1973 visitation at 240 people. Trestle Creek is partially developed, being utilized primarily as a day-use facility. This site is a considerable distance from other recreation sites and is located on the east shore of the lake. The only planned addition to these two sites is a vault-type toilet at Trestle Creek (4). Most of the Corps recreation sites are heavily used and are in need of maintenance.

RRMS data indicate a capital improvement total for the seven sites of \$122,000 for 1973 and the Riley Creek site accounted for \$91,500 of this expenditure. Operation and maintenance expenditures for the same period totaled \$77,700, with Riley Creek accounting for \$24,900. Total visitation for 1973 was 265,040 people (5). During the summer, resident, part-time maintenance personnel are stationed at the four sites (three fee areas) but their duties do not include fee collection.

Within Bonner County, the USFS has 115 picnic sites, 310 campsites, and 350 skiing acres. No recreation areas are associated with BLM holdings (7).

State-owned recreation sites include the Farragut State Park, on the southern reach of the lake in Kootenai County, and the Sunnyside State Park near the Pack River in Bonner County. Total state park facilities in the two counties include 199 campsites, 35 picnic sites, 6.5 mi of trails, and 1,773 ft of shoreline for swimming beaches (7). Two state recreation areas on the lake were leased from the Corps but were returned due to lack of operation and maintenance funds (2).

Some private lands have also been developed to accommodate recreation clientele. Within Bonner County alone the state has identified 3,309 private-sector recreation sites (7). One such area at Trestle Creek is a private camper-trailer site on approximately 30 acres of

land. Some of the trailer slips are utilized on a permanent basis and the monthly rental during winter is \$10.00 (8).

2. Lake Resources

Fishery resources at Pend Oreille Lake are highly utilized. Native fish include Dolly Varden, cutthroat trout, Kamloops, mountain whitefish, squawfish, and chubs. Other species have been introduced including kokanee, lake whitefish, and four species of trout (1). The most popular sport fish at Pend Oreille is the kokanee, followed closely by the kamloops and Dolly Varden trout. Kokanee and whitefish support the commercial fishery on the lake. Although there were no estimates of the economic contribution of commercial fishing, the USF&WS conservatively estimated that between \$500,000 and \$750,000 were spent by anglers for fishing in Pend Oreille Lake in 1951 (1).

The USF&WS concluded in its 1953 report on Pend Oreille Lake resources that the regulation of water levels necessary for power production would prove extremely detrimental to kokanee because it spawned in shallow water during the proposed drawdown period. Adverse effects on kamloops and Dolly Varden, whose principal food is the kokanee, were also predicted (1). Kokanee spawning was evaluated in 1972 and observations indicated that kokanee spawners had declined significantly, resulting in the loss of nearly 500,000 kokanee from the annual harvest (9).

During the summer of 1973 the Idaho Fish and Game Department (IFGD) held public hearings to discuss the decline of kokanee. By Fish and Game Commission action, commercial fishing was abolished and sport limits were reduced to increase spawning escapements in the lake for the remainder of the year. Further, negotiations with Washington Water Power were made for a joint study of water-flow conditions on the Clark Fork (9). The Corps has become involved and is coordinating with other federal agencies and the state in an attempt

to solve the problem but there does not appear to be a consensus at this time on the necessary steps or agency responsibilities.

Two hatcheries on the lake contribute significantly to the fisheries resources of Pend Oreille Lake and surrounding lakes. The Clark Fork Fish Hatchery stocked 53,000 pounds of fish in 1973 and construction is now scheduled to replace old raceways and add a Kamloops brood stock pond. In 1973, the Sandpoint Fish Hatchery stocked 432,232 kokanee, 103,792 cutthroat, and various other fishes (9).

Although water quality is reported to be good at Lake Pend Oreille, numerous sewage pipes were observed discharging from houses along the shore, and water uptake pipes were observed in close proximity to the discharge pipes. Most developments around the lake utilize septic tanks and, due to malfunctioning, a few small coves are experiencing algal blooms.

3. Wildlife

The IFGD leases approximately 3,780 acres for fish and wildlife management purposes (Table D.12.3). Although the area is called the Albeni Falls Wildlife Management Area, it consists of nine separate units around the lake (10). Most of the parcels are of little value to wildlife or to the hunting and fishing public (11). A majority of the acreage in these wildlife areas is below water at normal pool (Table D.12.4), and the Priest River and Riley Creek units are contiguous to Corps recreation sites. Mallard Bay Wildlife unit was not included in the original inventory (3) although it is included in the license agreement (10).

State management of these isolated parcels of the wildlife area is primarily aimed toward keeping the areas in their natural state although several access points have been provided. The expenditures for operation and maintenance for 1965-1970 was estimated by the IFGD to be less

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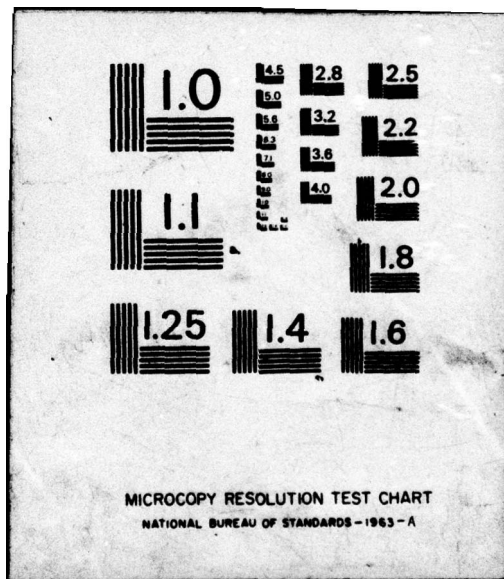


Table D.12.3. Outgrants for Fish and Wildlife -- Public Parks, Albeni Falls Dam.^a

Grantee	Instrument	Rental		Annual Rent Paid (\$)	Acreage	Investment	
		Date	Term (yrs)			To 1974 (\$)	Planned (\$)
Idaho Fish & Game	License	1956	50	0	3,780	N/A ^b	N/A

^a Seattle District, Real Estate Division. 1973. Report of compliance inspection -- outgrants. Seattle, Washington.

^b Not available.

Table D.12.4. Area Above and Below Water at Normal Pool at Pend Oreille Wildlife Units.^a

Unit	Location (Miles above dam)	Acres	
		Above 2026.5 ft msl	Below 2026.5 ft msl
North Shore Strips	0.5 miles-right bank	22	--
Priest River	5.0 miles-right bank	30	85
Cary Creek	8.0 miles-left bank	15	46
Riley Creek	12.0 miles-right bank	--	142
Hoodoo Creek	12.5 miles-left bank	30	52
Morton Slough	15.0 miles-left bank	53	349
Oden Bay	33.5 miles-right bank	26	324
Pack River	37.5 miles-right bank	121	1,253
Clark Fork	49.5 miles-right bank	204	951
Totals		501	3,202

^a Seattle District. 1974. Draft: inventory of resources, management, and development constraints. Seattle, Washington.

than \$4,700 (12). Of the amount expended between 1964 and 1965, the IF&GD estimated the percentage breakdown as: development 80%; maintenance 10%; management 10% (11). Sharecropping agreements are utilized to provide the Clark Fork unit (on a one-third to two-thirds basis) with green feed and grains for wildlife at no cost to the project. The IF&GD has increased the acreage in the Clark Fork unit by purchasing some of the islands at the confluence of Clark Fork with Pend Oreille Lake (13).

Although big game, upland game birds, fur animals, and waterfowl inhabit the lake area, waterfowl is the chief wildlife resource. The greatest concentration of wildlife is around the Clark Fork and Pack River areas (1) where most of the land is within an IFGD wildlife unit or the Kaniksu National Forest. Of importance to waterfowl is the adverse effect of drawdown in October. This drawdown exposes the shallow waterfowl feeding areas reducing food availability when waterfowl populations are highest (1).

4. Other Land Use

Timber resources account for a large portion of the economic base in Bonner County. There appeared to be no major impact on the lake by timber practices; although the lake has been utilized for log transport, the recent decline in logging and associated industries has lessened lake usage for log transport (3).

Some lead and silver mines are in operation around the Lakeview and Clark Fork Districts to the east of the lake (3). Although there are no quantitative data, there appeared to be no adverse effect upon the lake from mine waste drainage.

The Corps has outgranted approximately 44 acres for rights-of-way and other purposes (Table D.12.5). Eleven of these 13 outgrants extend indefinitely.

Table D.12.5. Outgrants for Rights-of-Way and Other Purposes, Albeni Falls Dam.^a

Purpose	Grantee	Instrument	Rental		Annual Rent Paid (\$)	Acreage	Investment	
			Date	Term (yrs)			To 1974 (\$)	Planned (\$)
Road R/W	Bonner Co., ID	License	1954	Indef.	0	15.26	N/A ^b	N/A
Road R/W	Bonner Co., ID	Easement	1956	Indef.	0	0.43	N/A	N/A
Road R/W	ID State Highway Dept.	Easement	1956	Indef.	0	2.35	N/A	N/A
Public Telephone	General Telephone of NW	License-blanket	1956	Indef.	10% Commission	----	N/A	N/A
Power Lines	Bonnerville Power Ad.	Permit	1956	Indef.	0	3.45	N/A	N/A
Road R/W	ID Highway Dept.	Consent to Easement	1956	Indef.	0	1.35	N/A	N/A
Track R/W	Spokane Internal. RR Co.	Easement	1960	Indef.	285 (for term)	1.90	N/A	N/A
Road R/W	ID Highway Dept.	Easement	1961	Indef.	0	0.80	N/A	N/A
Road R/W	ID Highway Dept.	Consent to Easement	1960	Indef.	0	1.15	N/A	N/A
Fallout Shelter Highway R/W	Bonner Co., ID	License	1962	Indef.	0	----	N/A	N/A
Construct & operate power transmission line	ID Highway Dept.	Easement	1964	Indef.	0	15.92	N/A	N/A
Electricity distribution line	Bonneville Power Ad.	Permit	1973	5	0	1.8	N/A	N/A
Totals	Northern Lights, Inc. 13 Outgrants	Easement	1974	50	0	----	N/A	N/A
						44.41		

^aSeattle District, Real Estate Division. 1973. Report of compliance inspection -- outgrants. Seattle, Washington.

^bNot Available.

5. Resource Use Controls

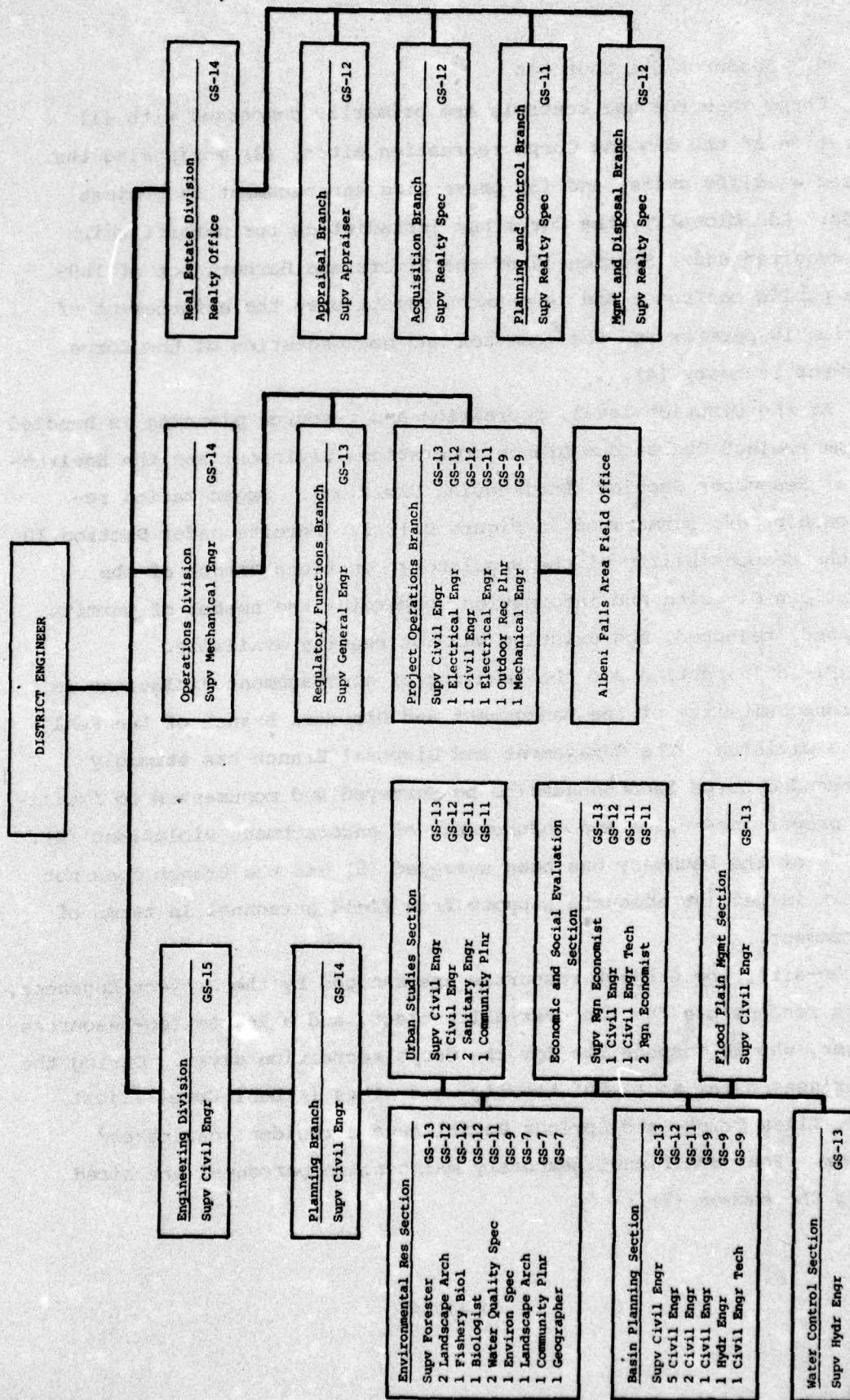
Corps resource use controls are primarily concerned with (1) operation of the dam and Corps recreation sites, (2) monitoring the leased wildlife units, and (3) preventing encroachment on project lands. Additionally, the Corps has jurisdiction for permits which are required under Section 10 of the Rivers and Harbors Act of 1899. Some public confusion and resentment exists over the enforcement of Section 10 permits and the location and monumentation of the Corps easement boundary (4).

At the District level, recreation and resource planning is handled in the Project Operations Branch (Operations Division) and the Environmental Resources Section (Engineering Division). Organization relationships are summarized in Figure D.12.2. Permits under Section 10 are the responsibility of the Regulatory Functions Branch of the Operations Division and information concerning the number of permits accepted, rejected, and existing was not readily available.

Field inspection and the handling of encroachment violations is the responsibility of the Management and Disposal Branch of the Real Estate Division. The Management and Disposal Branch has strongly recommended Corps land boundaries be surveyed and monumented to facilitate proper inspection and enforcement of encroachment violations (4). Only 7% of the boundary has been surveyed (5) and the Branch does not feel it is getting adequate support from field personnel in terms of enforcement.

On-site, the project resources are managed by the Project Engineer, who is responsible for the over-all project, and a Recreation-Resources Manager, who is responsible for the Corps recreation sites. During the summer season the four most heavily used sites (Albeni Cove, Priest River, Riley Creek, and Springy Point) have a resident caretaker/manager. Four additional temporary maintenance personnel are hired during the summer (5).

Figure D.12.2. Recreation-Resources Management Interrelationships - Seattle Engineer District.



Wildlife and fishery resources are managed by the IFGD through a field office at Sandpoint. Management of resources within the National Forest is the responsibility of the USFS.

The Bonner County Planning Commission has jurisdiction for zoning within the County. The Commission adopted a flood control ordinance in 1970 and requested Corps to prepare a flood plain report. The report was filed and approved in August of 1973.

III. KEY FINDINGS

A. Recreation

1. Prior to construction of the Albeni Falls Dam, Pend Oreille Lake was a natural lake. As such, the lake had an existing recreation base, and over 58% of the shoreline is still in private ownership.

2. Although the project was in full operation by 1955, the master plan for project land use, including recreation, was not prepared until 1964, and is now being revised.

3. The Corps operates six public recreation sites and a picnic area at the damsite. Of the 9,228 acres owned by the Corps, approximately 2% is developed for recreation. Four recreation sites are developed for family camping (three class B areas), and three of these have trailer sites available. Facilities at the trailer camp areas include centralized water systems, flush-type toilets, and flushing stations for camping trailers. Most of the sites were heavily used and in need of maintenance. No new facilities are planned except a bath and change house at one site.

4. During the summer recreation season, resident maintenance personnel are stationed at four of the public recreation sites. Their duties at these sites do not include fee collection as the method of collection is by fee deposit.

5. Most of the land bordering the eastern shore of the lake is within the Kaniksu National Forest. Within Bonner County, the USFS has developed 115 picnic sites and 310 campsites.

6. The State of ID owns approximately 3.5 mi of shoreline on which Farragut State Park and Sunnyside State Park are located.

7. Two recreation areas were outgranted to the state which operated them for a few years, then returned the areas to the Corps due to a lack of operation and maintenance funds.

8. The City of Sandpoint abuts the shore of Lake Pend Oreille and the city has developed a municipal park on shoreland which it owns. Several buildings within the city limits are adjacent to the shore.

9. Some of the private land bordering the lake has been developed to accommodate recreation clientele. Within Bonner County, the state has identified 3,309 private recreation sites. Development of these sites around the lake includes camping areas, seasonal trailer parks, marinas and boat slips, and associated sales and services.

B. Fish and Wildlife

1. The IFGD has license to 3,780 acres for management. Although the area is called the Albeni Falls Wildlife Management Area, it consists of nine isolated small tracts around the shore. Two units are adjacent to the Corps recreation areas receiving the highest visitation. The majority of the licensed area is under water at normal pool (2062.5 ft msl) and is of little value to wildlife or the hunting and fishing public. From 1965 to 1970, the state estimated a total operation and maintenance expenditure of \$4,700 for the Albeni Falls Wildlife Management Area.

2. Pend Oreille is a well known and long established kokanee sport fishing lake. Drawdown occurs at the time of kokanee spawning and as early as 1953 the USF&WS cited the potential drawdown problem and recommended the district consider other release schedules. The kokanee population has declined significantly and commercial fishing for kokanee was abolished in 1973. Pend Oreille was one of the few inland lakes in the U. S. which naturally supported a commercial fishery.

3. Drawdown also exposes the shallow waterfowl feeding areas during the winter, reducing food availability when waterfowl populations are highest.

C. Corps and Contiguous Land Use

1. Shoreline ownership consists of: private, 58.8%; railroad and highway embankment, 15.5%; USFS, 12.8%; Corps, 11.2%; State of ID, 1.5%; and city of Sandpoint, 0.2%.

2. Only 7% of the Corps project boundary has been surveyed. This factor, coupled with the large amount of privately-owned land, causes difficulties in enforcing encroachment violations.

3. The availability of waterfront property has attracted investors and buyers throughout the Pacific Northwest. Considerable housing development abuts the shore, particularly around and across the lake from Sandpoint. At least seven separate areas have concentrated housing development, and a lakefront condominium development is under construction southwest of Sandpoint.

4. Working relationships and communications between Corps personnel and the local populace are strained due to confusion concerning Section 10 permits and the unmarked Corps easement boundary. The fact that Corps facilities at Pend Oreille were not included in the state's Outdoor Recreation Plan appears to indicate some lack of communication.

D. Real Estate Programs and Practices

1. The Real Estate Division has recently requested that Corps boundaries (fee and easement) be surveyed and monumented to facilitate compliance inspections.

2. Information concerning permits (total, number requested, number accepted and rejected) under provision of Section 10 of the River and Harbor Act of 1899 was not readily available. The district reported that the number of requested permits had significantly increased in the last few years and that requests very rarely were denied.

3. The Real Estate Division does not feel it is receiving adequate support in terms of encroachment enforcement by the project staff.

E. Corps Organization

1. On-site Corps personnel are: Project Engineer, Recreation-Resource Manager, and one maintenance man. Eight temporary maintenance people are hired during the summer. The duties of the Recreation-Resource Manager are the same as the duties of a Park Ranger.

F. Environmental Problems

1. Although water quality is reported to be good at Lake Pend Oreille, numerous sewage pipes were observed discharging from houses along the shore, and water uptake pipes were observed in close proximity to the discharge pipes. Most developments around the lake utilize septic tanks and, due to malfunctioning, a few small coves are experiencing algal blooms.

2. There are a few lead and silver mines in operation east of the lake. The effect of mine waste drainage into the lake is not known.

IV. REFERENCES

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10. Seattle District, Real Estate Division. 1956. License for fish and wildlife purposes, Albeni Falls Reservoir area. Seattle, Washington.
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13. JOHN DAY LOCK AND DAM
North Pacific Division
Portland District
Oregon (Primary) and Washington (Secondary)

I. SETTING

A. Location

The John Day Lock and Dam is a power and navigation project on the Columbia River in north-central Oregon and south-central Washington, 215.6 miles (mi) east of the river's mouth and 87 mi east of Portland, OR. Located east of the Columbia River Gorge in the semi-arid Columbia Plateau, the lock, dam, and reservoir comprise one of several developments on the Columbia-Snake River Inland Waterway System (1).

The John Day project is located in Sherman, Gilliam, Morrow, and Umatilla Counties, OR, and Klickitat and Benton Counties, WA. The towns of Arlington, Boardman, Irrigon, and Umatilla border the reservoir on the south shore in OR, and the communities of Roosevelt, Paterson, and Plymouth border the north shore of the reservoir in WA.

Highway and railroad embankments bordering the recreation pool restrict access to the reservoir. However, direct access to the pool is obtained at 15 highway interchanges and/or access roads. WA 14 borders the north shore except 2 mi east of Plymouth, and I 80N, "The Old Oregon Trail", and U. S. 730 border the entire southern shore. Bordering the reservoir from east to west are the Burlington Northern Railroad on the north shore and the Union Pacific Railroad on the south shore (Figure D.13.1).

JOHN DAY DAM OREGON - WASHINGTON

LEGEND

Cities - Towns

..... State Border

★ Ports

U.S. Highways

State Roads

Interstate Highways

--- Wildlife Management Area

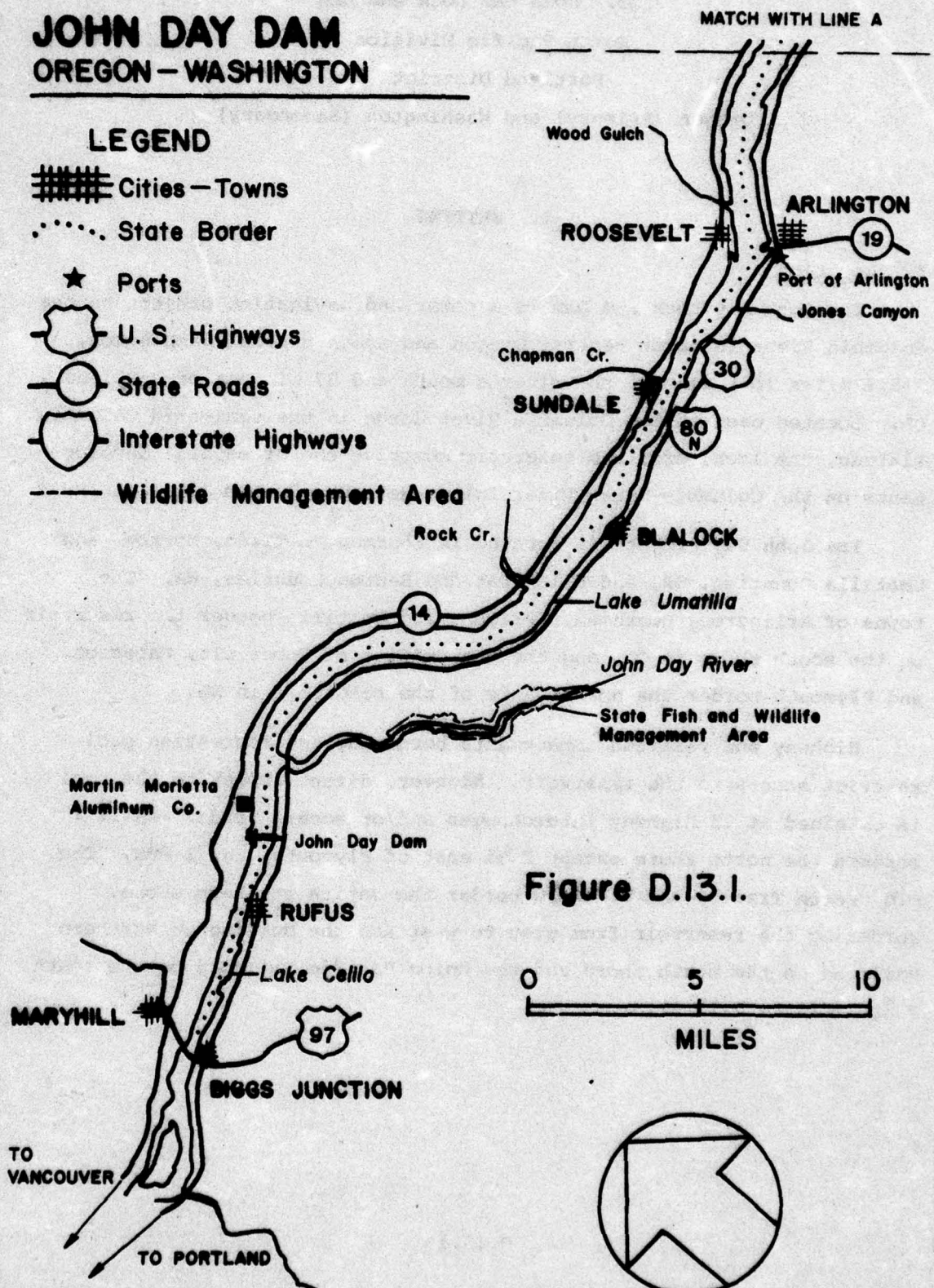
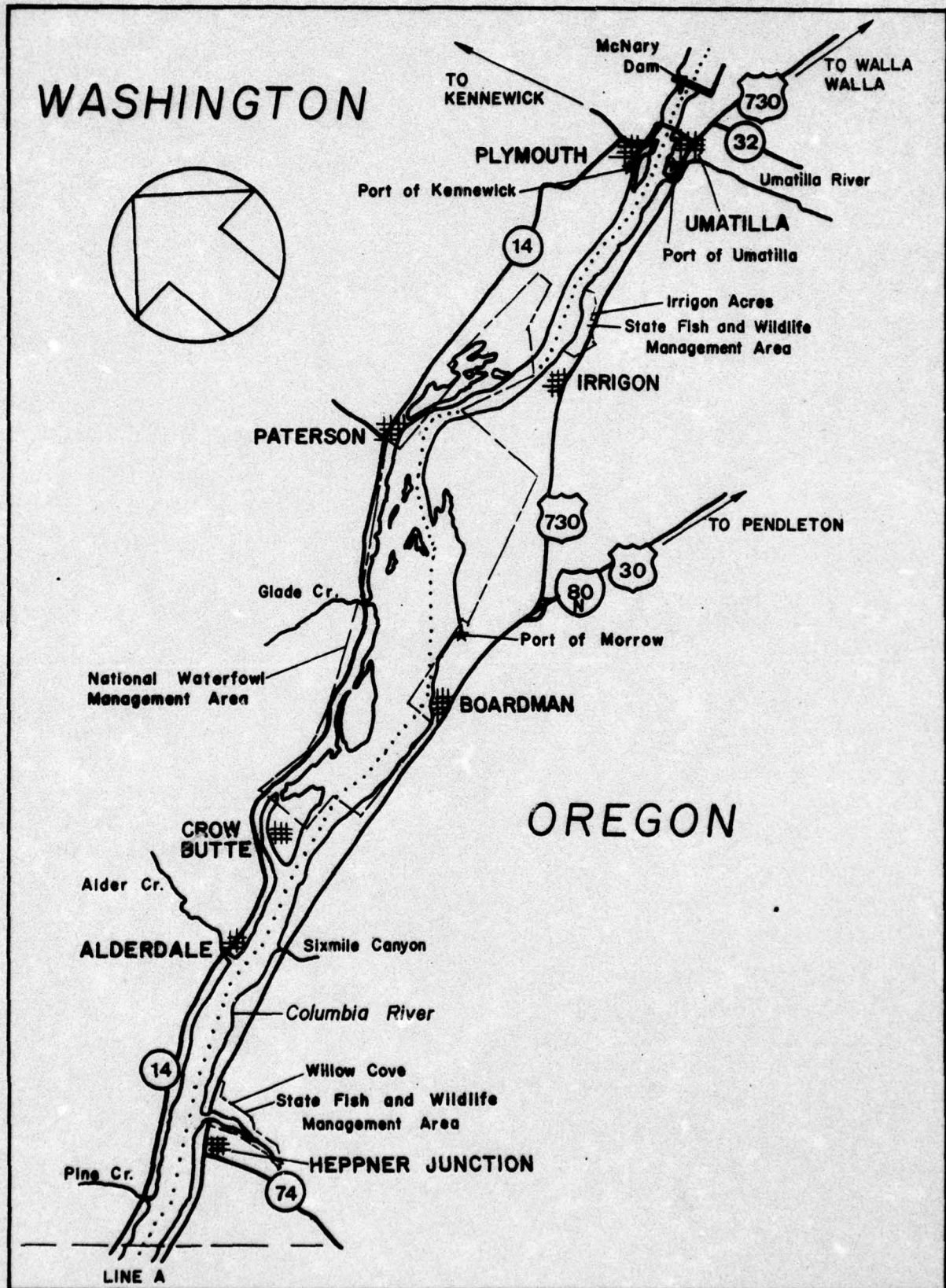


Figure D.13.1.



D.13.2A

B. Authorization and Purposes

The John Day Lock and Dam project was authorized by the Flood Control Act of 1950 (PL 81-516). The project was originally authorized for navigation, flood control, and power (2).^a

After further investigations by the Corps, modified flood control features were added by Congress in 1957 (S. Doc. 85-10) (2). Currently, the project is managed for navigation, flood control, irrigation, power, recreation, and fish and wildlife enhancement (1).

C. Features

The principal operating features are the single lift navigation lock and 20-bay hydroelectric power generating plant. Designed to accommodate barge traffic, the navigation lock, which can be filled in 15 minutes, is 675 feet (ft) by 86 ft with a maximum lift of 113 ft. Sixteen units of the power generating plant are currently installed, capable of producing 2,484 megawatts (1).

Additional features include 20 spillway bays and a downstream stilling basin, plus two fish passage facilities and a fish collection system. The spillway bays are 50 ft wide and are capable of discharging 1.6 million cubic ft of water per second at normal pool elevation. The fish collection system attracts migrating fish into channels that lead to fish ladders for dam passage (2). Refer to Table D.13.1 and Table D.13.2 for further project features.

The reservoir, Lake Umatilla, extends 76.4 mi east to McNary Lock and Dam and is less than 2 mi wide, providing a water surface area of

^a The Secretary of the Army has been authorized, since 1944, to construct, maintain, and operate public park and recreational facilities at water resource development projects. 16 U.S.C. 460d. Since 1946, the Army Corps of Engineers has been required, when consistent with a project's primary purposes, to make adequate provision for the conservation, maintenance, and management of wildlife resources. 16 U.S.C. 663(a).

Table D.13.1. Resource Statistics, John Day Lock and Dam.

Date of Authorization	1950 ^a
Rights in Land Acquired Between	1958-1966 ^b
Date of Impoundment	April, 1968 ^c
Date of Full Operation	November, 1971 ^c
Lake Size When Water Level is at:	
Maximum Pool Elevation (268 ft msl)	54,000 acres ^d
Normal Pool Elevation (265 ft msl)	49,300 acres ^a
Normal Minimum Pool Elevation (257 ft msl)	41,500 acres ^d
Minimum Design Elevation	NA ^e
Water Fluctuation - Summer Recreation Season	3 feet ^a
Shoreline at Normal Pool	240 miles ^c
Held in Fee Simple by Corps	240 miles ^c

^a Walla Walla District. 1965. Master plan for development and management of Lake Umatilla, John Day project, design memorandum No. 25B. Walla Walla, Washington.

^b Personal Communication, 19 November 1974. Portland District, Real Estate Division, Management and Disposal Branch, Portland, Oregon.

^c RRMS. 1973.

^d Personal Communication, 20 November 1974. Portland District, Engineering Division, Planning Branch, Recreation Planning Section, Portland, Oregon.

^e Not applicable.

Table D.13.2. Land Area Managed by Corps, John Day Lock and Dam.

	Master Plan ^a (acres)	RRMS 1973 ^b (acres)	
Total Land in Project	76,600	54,426	(46,928) ^c
Inundated by Normal Pool	49,300	30,000	(38,540) ^c
Area in Old Riverbed (OHW to OHW) ^d	27,570	27,570	
Land Acquired in Fee (OHW to 265 ft msl)	21,730	10,642	
Flowage Easements	0	328	
Land Higher than Normal Pool	27,300	24,426	(8,388) ^c
Fee Title Acquired (265 ft msl to Project Boundaries)	19,689	8,388	
Public Domain Withdrawn (OHW to Project Boundary)	8,639	0	
Land Sold to State of Oregon	-1,028	-	
Project Operation Lands	277	218	
Manageable Resource Lands ^e	27,023	8,170	

^a Walla Walla District. 1965. Master plan for development and management of Lake Umatilla, John Day Project, design memorandum No. 25B. Walla Walla, Washington.

^b RRMS. 1973.

^c Actual internal total.

^d Original high water.

^e Total acreage minus (Area Inundated at Normal Pool + Flowage Easements + Project Operations Lands).

49,300 acres at normal pool elevation. The westward one-third of the reservoir lies between rugged basalt cliffs and steep slopes up to 1,000 ft elevation. Upstream, the eastern two-thirds of the reservoir shoreline has more gentle and rolling topography. The Columbia Plateau extends north and south from the reservoir canyon rim (1).

Grasslands, characterized by sparse vegetation, are naturally dominant with cultivated grains grown on the open expanses. Along the river's edge, occasional cottonwood, willow, locust, and poplar grow where the water table is close to the surface. Irrigated fields on the plateau produce excellent yields of hay, fruits, and vegetables (1).

The Columbia River Basin drainage area includes 259,000 square miles (sq mi) of the rugged mountain regions in OR, WA, Idaho, the western part of Montana, and some 39,500 sq mi in British Columbia. Each spring the runoff from melting snow in the mountains gradually increases to a peak usually during the first half of June (3). The main tributaries which empty directly into John Day Reservoir are: John Day River, Willow Creek, Rock Creek, Alder Creek, and Umatilla River.

II. LAND USE, RECREATION, AND FISH AND WILDLIFE CONSIDERATIONS

A. Analytical Unit

The project's analytical unit is limited by the canyon rim and includes those towns and communities adjacent to the project boundary. From west to east the height and steepness of the surrounding cliffs diminish, widening the area from lake shore to plateau edge. From Willow Creek east to the McNary Dam on the south shore, the natural canyon rim is no longer distinguishable and the primary zone influenced by the project is limited by the highway and railroad embankments.

The towns of Irrigon and Boardman, plus several small communities, were relocated to a higher elevation before impoundment of Lake Umatilla. Vegetation along the former river edge was inundated as were many island waterfowl nesting grounds.

Farmland along the river's edge has been rotated between wheat and fallow since the early 1900's, the fallow soils being especially subject to erosion. The plains and plateaus above the river are used for dryland cultivation, while the intervening ravines and steep canyons are used for grazing.

Flood control regulation on the Columbia Basin has resulted in annual benefits over \$100 million for the past 10 years. Crops irrigated by waters from the Columbia system have values estimated at \$60 million annually. The Columbia River Basin system of locks has provided navigation which now exceeds 4 million tons annually (3).

B. Ownership

1. Corps

The Corps has acquired in fee title 41,419 acres of land from the original high water (OHW) to the present project boundary; of this acreage, 1,028 acres were sold to the State of OR for the Boardman

Space Age Industrial Area. In addition, 8,639 acres of land from the OHW to the present project boundary were transferred to the project from public domain. With the addition of 27,570 acres of old riverbed, the total project area consists of 76,600 acres (2).

There are 27,300 acres of land in the project above the normal pool elevation of 265 ft mean sea level (msl) (2). Table D.13.3 shows the approximate allocation of project lands above normal pool.

The acreage reported in the 1965 Master Plan and the 1973 RRMS do not agree (Table D.13.2). The 1973 RRMS reports less acreage in all categories except the old riverbed acreage. The total project acreage reported by the 1973 RRMS is 22,174 acres less than the acreage reported in the 1965 Master Plan (1, 4).

2. County. Municipal, Special District

There are 12 port terminal sites allocated on project lands of which four have been conveyed to public ownership (1).^a Located on the OR shore are: Port of Arlington, Port of Morrow, and Port of Umatilla. The Port of Kennewick is located on the WA shore (Figure D.13.1).

C. Resource Management

1. Recreation

Recreation facility development on all 21 sites at the John Day project has been totally financed by the Corps with \$8,051,000 invested through October 1974 (6). All future recreation facility development, except those areas currently scheduled for completion, will require cost-sharing agreements (1).

^a Under provision of Section 108 of PL 86-645 (74 STAT. 486), public port terminals may be made available for conveyance to states, political subdivisions thereof, port districts, or port authorities (2).

Table D.13.3. Land Allocation of Project Acres Above Normal Pool Elevation, John Day Lock and Dam.^a

<u>Land Allocation</u>	<u>Acreage</u>
Project Operation	277
Public Recreation	
Initial Development	2,191
Future Development	1,049
General Access (Highway and Railroad Right-of-Way)	9,257
Quasi-public Recreation	147
Private Recreation	57
Public Port Terminal	296
Industrial Use and Access	2,938
Fish and Wildlife	<u>11,089</u>
Total	27,300

^a Walla Walla District. 1965. Master plan for development and management of Lake Umatilla. John Day Project, design memorandum No. 25B. Walla Walla, Washington.

Leases for five public parks on a total of 561.6 acres are currently signed for 25 year terms but only two are being operated and maintained by the lessee (Table D.13.4). Irrigon Community Park and Recreation Maintenance District operates and maintains Irrigon Park, and the Port of Umatilla, under a sublease from Umatilla County, operates and maintains Wanahla Marine Park. Benton county signed a lease for Plymouth Park in January 1968, but awaits completion of initial Corps recreation facility development, estimated to be spring of 1975, before assuming operation and maintenance responsibilities. Boardman Park and Recreation District signed a lease for a public park in November 1974, but also awaits completion of initial Corps recreation facility development before assuming operation and maintenance responsibilities at Boardman Park. Umatilla School District #6R signed a lease for an outdoor education and recreation area in November 1974. Development of an outdoor education program and various athletic facilities are scheduled for the area but the Corps will develop only a portion of the outdoor education program (5).

The recreation areas close to the towns and communities were cooperatively planned and developed by the Corps and the towns as mitigation for loss of river access and for the necessity of relocation caused by increased river elevation (2). Some of the public use and access areas were scheduled to be operated and maintained by local towns and/or communities upon completion of Corps development. However, most of the local governments could not finance the cost of operation and maintenance even after the initial development, and the Corps assumed these responsibilities to prevent fire and to protect recreation facility investments (7).

The only recreation areas currently being operated and maintained by a non-Corps agency are Irrigon Park and Wanahla Marine Park.

Table D.13.4. Outgrants for Fish and Wildlife and Recreation -- Public Parks, John Day Lock and Dam.^a

Grantee	Instrument	Rental		Annual Rent Paid (\$)	Acreage	Investment	
		Date	Term (yrs)			to 1974 (\$)	Planned (\$)
State of Oregon	License	1971	25	0	505.0	N/A ^b	N/A
Oregon State Game Commission	License	1971	25	0	646.0 ^c	N/A	N/A
U. S. Dept. of Interior	Cooperative Agreement	1969	Indefinite	0	18,758.0 ^c	N/A	N/A
U. S. Dept. of Interior	Permit	1971	5	0	670.0	N/A	N/A
Benton County	Lease	1968	25	0	386.0	N/A	N/A
Boardman Park and Recreation District	Lease	1974	25	0	44.0	N/A	N/A
Irrigon Community Park and Recreation District	Lease	1968	25	0	31.6	58,110	N/A
Umatilla County	Lease	1968	25	0	60.0	85,569	N/A
Umatilla School District #6R	Lease	1974	25	0	40.0	N/A	N/A
Totals 9				0	21,140.6	143,679	

^a Portland District, Real Estate Division, Management and Disposal Branch. 1974. Outgrant agreements and annual management reports. Portland, Oregon.

^b Not available.

^c Acreage includes water and land area.

Leases at Plymouth and Boardman Parks will be executed under terms of the lease upon completion of Corps' initial development, but because the parks are open to visitation before and during construction, the Corps is responsible for interim operation and maintenance (5).

Upgrading for Roosevelt Park and Crow Butte State Park is scheduled, with Klickitat County and the Washington State Parks and Recreation Commission assuming operation and maintenance responsibilities after completion (1).

Monumentation and interpretation of the portion of the "Lewis and Clark Trail" that passes through the John Day project is integrated into eight commemorative campsite markers and one interpretive plaque at public access areas. The Corps and the Lewis and Clark Trail Commission coordinated design and installation of the markers and plaque into the overall "Trail" concept (2).

Currently the Recreation Resources Section of The Dalles/John Day project operates and maintains 16 recreation areas, 3 public access and sanitary facility areas, plus guiding daily tours of the dam and lock at the John Day project. Twelve of the recreation areas have boat ramps and six have camping facilities with 185 total campsites. Picnicking is provided at 13 areas with 123 total picnic sites. Boardman Park was the only recreation or public access area requiring a user fee (\$3.50 per night) in 1974, although Philippi Park required a user fee in 1973 (8).

The 1973 RRMS reports \$50,800 for operation and maintenance on 15 Corps-managed recreation and public access areas and \$32,200 for operation and maintenance on Irrigon and Wanahla Marine Parks. Also reported in the 1973 RRMS are capital investments of \$2,343,000 on Lepage, Arlington, Boardman, Irrigon, and Wanahla Marine Parks (4).

Monthly vehicle counts are taken by traffic counters located at each park entrance. Total visitation counts and percent of recreation activity use are derived from the vehicle counts by applying factors developed in a 1968 user survey (9). Sightseeing is the greatest recreation activity with most visitors viewing the project dam, lock, and fish ladders. The heaviest used region on the recreation pool is the slack water on the John Day River where LePage and Philippi Parks provide overnight camping, picnicking, swimming, water skiing, and fishing (4, 7).

The recreational areas and facilities at Lake Umatilla are used by two distinct population groups: local residents and non-resident tourists. The resident sector is comprised of individuals living in small towns (situated along the lake) and rural households and communities within 10 to 15 mi of the lake. Non-resident users come from more populous areas outside the 15 mi zone including the Portland metropolitan area (10).

Visitation estimates for 1973 were 1,140,500 (4). Facilities developed initially and planned for future visitor pressure are based on visitation projections for the 100th year of operation of 2.9 million.

Six recreation areas other than the recreation areas associated with the John Day project exist within a 25 mi zone around Lake Umatilla: four local parks, one Corps park, and one national wildlife refuge. An additional 50 recreation areas exist within a 75 mi zone around Lake Umatilla: 18 state parks and monuments, 5 Corps parks, 5 local parks, 17 USFS areas, 3 wildlife areas, and 1 national monument (2).

2. Lake Resources

The overall quality of the Columbia River water is good. The Washington State Department of Ecology and the Oregon State Department

of Environmental Quality have designated water use and quality between river mi 215 and 294 (Lake Umatilla) as Class A, the highest quality. Dissolved oxygen levels range from 75 to 136% of saturation, with a mean value of about 105%. A dissolved oxygen level of 90% is the satisfactory minimum (1). Coliform bacteria concentrations are acceptable at levels below 240 per 100 milliliters (ml). River samples have contained concentrations as high as 6,300 per 100 ml but the average value is 170 per ml. The hydrogen-ion concentration (pH) is considered satisfactory between a range of 7.0 to 8.5. Values found in the river range from 6.5 to 8.5 with a mean of 7.9 (1).

Water quality has been maintained at a level adequate for most water uses by tightening regulations governing effluent discharge into the river (1). Although the average sediment load carried by the river is small (90 parts per million), the annual suspended sediment load amounts to 14,500,000 cubic yards due to the large river flow (1).

Umatilla Lake fluctuates between 262 and 265 ft msl most of the year but is drawn down in the winter months to a low of 257 ft msl in anticipation of the spring freshet. A minimum pool elevation of 257 ft msl is retained for operation of the hydroelectric power plant. Maximum pool elevation at flood stage is 268 ft msl (2).

The Pacific Northwest River Basin Commission reports that nitrogen supersaturation caused by waters flowing over the John Day spillways causes more fish losses than do the hydroelectric turbines. Water passing over the spillway captures air and carries it deep into the river current and supersaturation of nitrogen and other gasses results. Upon reaching the dam, migrating fish rise near the water surface, in order to enter the fish collecting systems and fish ladders, enabling body nitrogen and other gas bubbles to expand causing gas embolism (1, 10).

Spillway designs and flow deflectors are currently being studied by representatives from USF&WS, the National Marine Fisheries Service, the Washington Department of Game, the Washington Department of Fisheries, and Oregon Wildlife Commission (OWC), and the Fish Commission of Oregon (FCO) along with the Corps. Deflector additions to the spillway design should alleviate supersaturated gasses from the river depths (10).

As mitigation for lost spawning and rearing areas inundated by the John Day pool and blockage of fish migration by the dam, the Corps has incorporated fish passage facilities in the dam structure and is financing two existing fish hatchery facilities. A fish collection channel with numerous openings lies at the waterline across the front of the dam enabling migrating fish to enter and proceed to fish ladders, one on each shore, for passage by the dam (1).

Upstream and downstream fish migrations are affected by the dam structure, water level from power-peaking operations, water temperature and turbidity, and flow velocity. The FCO reports 10% mortality on summer chinook salmon migrating upstream past the John Day Dam with a 0.5 to 1 day delay (1).

Although the John Day Powerhouse is equipped with a fingerling bypass system, the majority of young fish migrating downstream move with the water and are carried over the spillways or through the turbines. Experiments on Kaplan-type turbines like the ones at John Day show a range of 74 to 93% survival of young fish passing through the turbines. Modifications on the bypass system of travelling screens are underway to increase the passage of downstream migrating fish through the system (1).

To provide for the total mitigation requirement of a yearly run of 30,000 adult chinook salmon, 17 million fall chinook fingerlings will

be produced at two fish hatcheries. The Spring Creek Hatchery operated by the USF&WS has had production capacity increased to 8,550,000 fall chinook fingerlings per year to provide one-half the requirements. The Bonneville Hatchery operated by the FCO will be expanded in the next two years to provide the remaining production requirements (1).

The John Day pool falls within two OR angling zones with differing regulations for salmon and steelhead trout fishing. Enforcement of fishing regulations is the responsibility of the Oregon Wildlife Commission through the Oregon State Police.

Indian tribes throughout the Pacific Northwest retain fishing rights on the Columbia River. They are not required to obtain state fishing licenses or restricted on the number of fish taken. As a result, nets are often used above and below the dam where migrating fish accumulate (11).

3. Wildlife

There are four agreements for fish and wildlife purposes on the John Day project involving a total of 20,579 acres of land and water (Table D.13.4). Willow Creek Arm (646 acres of land and water) and the Irrigon Acres (505 acres of land) are licensed to the State of Oregon for 25 years. The Umatilla National Wildlife Refuge (NWR) is mainly on 18,758 acres of land and water under cooperative agreement with the USF&WS as mitigation for losses of waterfowl nesting islands inundated by the reservoir. This cooperative agreement is for an indefinite period; an additional 5-year permit to the USF&WS covers 670 acres of land zoned for industrial use. This acreage is currently receiving the same waterfowl management practices as the rest of the refuge and a more permanent agreement has been requested (5).

Lake Umatilla lies within a principal migratory waterfowl route of the Pacific Flyway, and provides a resting area for ducks and geese migrating to and from their northern breeding grounds. The waters of the John Day project inundated most of the islands used by waterfowl for spring breeding areas and resting during migration. Before completion of the John Day project hunting was not permitted on or within 0.25 mi of the Columbia River, except in a few specifically designated areas (12, 13).

The Umatilla NWR was established on land acquired for the project and land specifically acquired by an act of Congress. The refuge occurs on portions of both the WA and OR shoreline and on several islands along the upstream part of the John Day project between river mi 263 and 281 (Figure D.13.1). The land acreage is less than the water acreage and is interspersed occasionally with land developed or designated for industry, recreation, and commerce. One section of land designated industrial on Whitcomb Flats is owned by the Port of Benton County, but is permitted to the USF&WS for five years and is receiving the same extensive waterfowl management practices as the NWR (1).

Loss of islands inundated by the lake has caused a decrease in resident geese, but due largely to NWR waterfowl management practices the resident duck population and the number of ducks and geese using the region during migration have increased (14). Peak populations of waterfowl are seen on the refuge from October through March with wintering geese numbering over 50,000. Thousands of ducks, mostly Mallards, use the refuge for wintering (1).

Waterfowl food and cover crops are planted at Irrigon Acres and Willow Cove Arm by the OWC where excellent waterfowl habitat is maintained and extensively utilized by resident and migrant ducks and geese.

The land along the upper reaches of Lake Umatilla is allocated for a fish and wildlife area (607 acres) and was to be managed by the OWC. Due to the remoteness and narrowness of the area abutting the river, the Commission rejected acceptance of the land for management (11).

Waterfowl feed extensively on the grain fields surrounding the project especially during the winter months. With the increased number of waterfowl making use of the food source, hunting pressure has also increased. Because limited hunting is permitted along Lake Umatilla and within the state and federal refuges, a heavy hunting pressure exists on surrounding lands where farmers charge for use of their land (11).

The land areas bordering the lake and in the upper reaches of tributary streams of the project support various small mammals, upland game birds, and some mule and mule-black-tailed hybrid deer. Significant populations of coyote and bobcat inhabit the area. Several varieties of hawk and owl occur in the region, with Ospreys and Red-tailed Hawks nesting on the cliffs surrounding the westward part of the project (1).

4. Other Land Use

The project purposes of navigation, flood control, power production, and irrigation directly benefit land use practices in and around the John Day project. Four public port terminals along the lake, three on the OR shore and one on the WA shore, are used mainly for exportation of agricultural products and importation of petroleum products (1).

Located on the WA shore near the dam, the Martin Marietta Aluminum Company benefits from the ready supply of electricity. The

plant is located on 105 acres of project land that is leased for 50 years. The facility is a large dirty structure and produces harmful air pollutants, principally hydrogen fluoride, which damage orchard crops and vegetation fed upon by cattle (1). Waste water discharged into the reservoir from the plant adds head and dissolved and suspended solids which result in unknown impacts on aquatic organisms. The plant employs about 1,000 persons and annually produces 190,000 tons of aluminum ingot (1).

One agriculture lease with a 1-year term on 4 acres of project land, and 14 grazing leases with 5-year terms on 969.7 acres of project land (that range from 5 to 200 acres) annually generate \$1,707 revenue. One commercial and industrial lease with the Martin Marietta Aluminum Company for a 50 year term on 104.7 acres of project land annually generates \$6,000 revenue. There are 106 various purpose lease, license, easement, and permit agreements for terms ranging from 5 years to perpetual on about 470 acres of project land which annually generate \$1,048 revenue (Table D.13.5). Table D.13.6 summarizes the outgrants on the John Day project.

The Bonneville Power Authority administers the sale and distribution of electricity produced by the John Day project. The project is integrated with all power producing plants in the Columbia River Basin which collectively distributes power throughout the Pacific Northwest. The major consumers of energy sales in the Pacific Northwest in 1970 were: industrial users (50.3%), domestic users (31.4%), and commercial users (13.8%) (1).

The major collateral benefit from the project is the tremendous supply of water in a semi-arid region. Farmers continue to extend irrigation to the level, fertile land surrounding the project. However, there is no overall view nor control of total water with-

Table D.13.5. Outgrants for Agriculture, Grazing, and Miscellaneous Purposes, John Day Lock and Dam.^a

Purpose	Grantee	Out-grants	Instrument	Rental		Annual Rent Paid (\$)	Acreage	Investment	
				Date	Term (yrs)			to 1974 (\$)	Planned (\$)
Agriculture	Sundale Orchards, Inc.	1	Lease	1973	1	200	4.0	N/A ^b	N/A
Grazing	Summary	14	Lease	1970-1974	5	1,507	969.7	N/A	N/A
Commercial and Industrial	Martin Marietta Alum. Co.	1	Lease	1969	50	6,000	104.7	N/A	N/A
Barge Dock and Grain Loading Facility	Farmers Warehouse and Commission Company	1	Lease	1973	25	100	0.8	N/A	N/A
Sewage Lagoon	City of Boardman	1	Lease	1965	50	144	9.2	N/A	N/A
Well, pump, and line	Port of Morrow	1	License	1969	5	20	0.1	N/A	N/A
Conveyor loading facility	Morrow County Growers	1	License	1973	5	25	0.3	N/A	N/A
Loading Point	Tidewater Terminal Co.	1	Lease	1967	25	250	25.7	N/A	N/A
Water Collector Plant	C & B Livestock	1	Lease	1974	40	375	N/A	N/A	N/A
Irrigation Lines	O. L. Crisp	1	License	1973	25	20	1.8	N/A	N/A
Right of Way	Summary	79	Easement	1955-1974	5-50	113	356.8	N/A	N/A
Right of Way	Summary	20	Permit	1966-1973	5-Perpetual	0	75.2	N/A	N/A
Totals		122				8,755	1,548.3		

^a Portland District, Real Estate Division, Management and Disposal Branch. 1974. Report of compliance inspection - outgrants, John Day Lock and Dam. Portland, Oregon.

^b Not available.

Table D.13.6. Summary of Outgrants, John Day Lock and Dam.

Purpose	Number	Annual Rent (\$)	Acreage	Investment to 1974 (\$)
Fish and Wildlife and Recreation -- Public Parks	9	0	21,140.6	143,679
Agriculture, Grazing and Miscellaneous	122	8,755	1,548.3	N/A ^a
Totals	131	8,755	22,688.9 ^b	143,679

^a Not available.

^b Total reflects inclusion of land and water acres and exclusion of Corps maintained recreation areas.

drawal from both the Columbia and Snake Rivers (15). Also lacking is an overall coordination between OR, WA, and ID for the prevention of potential conflicts caused by separate states granting individual water rights (15).

The Walla Walla Engineer District has prepared an assessment of environmental impacts from irrigation permits and related easements granted in that district (16). The Corps' North Pacific Division feels that this study should be expanded to include the Portland and Seattle District jurisdiction of the Columbia and Snake Rivers (15).

Although the amount of withdrawal from the rivers is not controlled by the Corps, it is feasible to assume that the Corps could restrict or promote irrigation by following respective policies regarding Section 10 permits for pump intakes and easements for pump sites and pipelines on Corps property. To date, the total authorized use of waters for irrigation from the Columbia River is about 6,000 cubic feet per second (cfs) (granted by WA and OR) which is less than 15% the minimum flow of the river. The Snake River has about 800 cfs authorized for irrigation which is about 5% of the record low flow of that river (15).

The states of WA and OR have authorized 996 cfs from Lake Umatilla for irrigation (1). The Corps has issued 99 right-of-way agreements, the majority of which are for irrigation pumps and pipelines, and two licenses and one lease for water collecting purposes on the John Day project (Table D.13.5).

Although the annual withdrawal of water (100,000 acre-ft) (1) does not affect navigation in Lake Umatilla, the amount withdrawn by pumping stations located on the John Day and Umatilla Rivers do affect navigation. Because the withdrawal of water exceeds the flow of these tributary rivers, waters from the lake flow into the tributaries maintaining a constant pool level and carry sediment which enhances bar

formation at the mouth of each river. The bar restricts small boat navigation into these rivers and requires maintenance dredging (7). Information concerning the effect of bar formation on fish populations is not available (1).

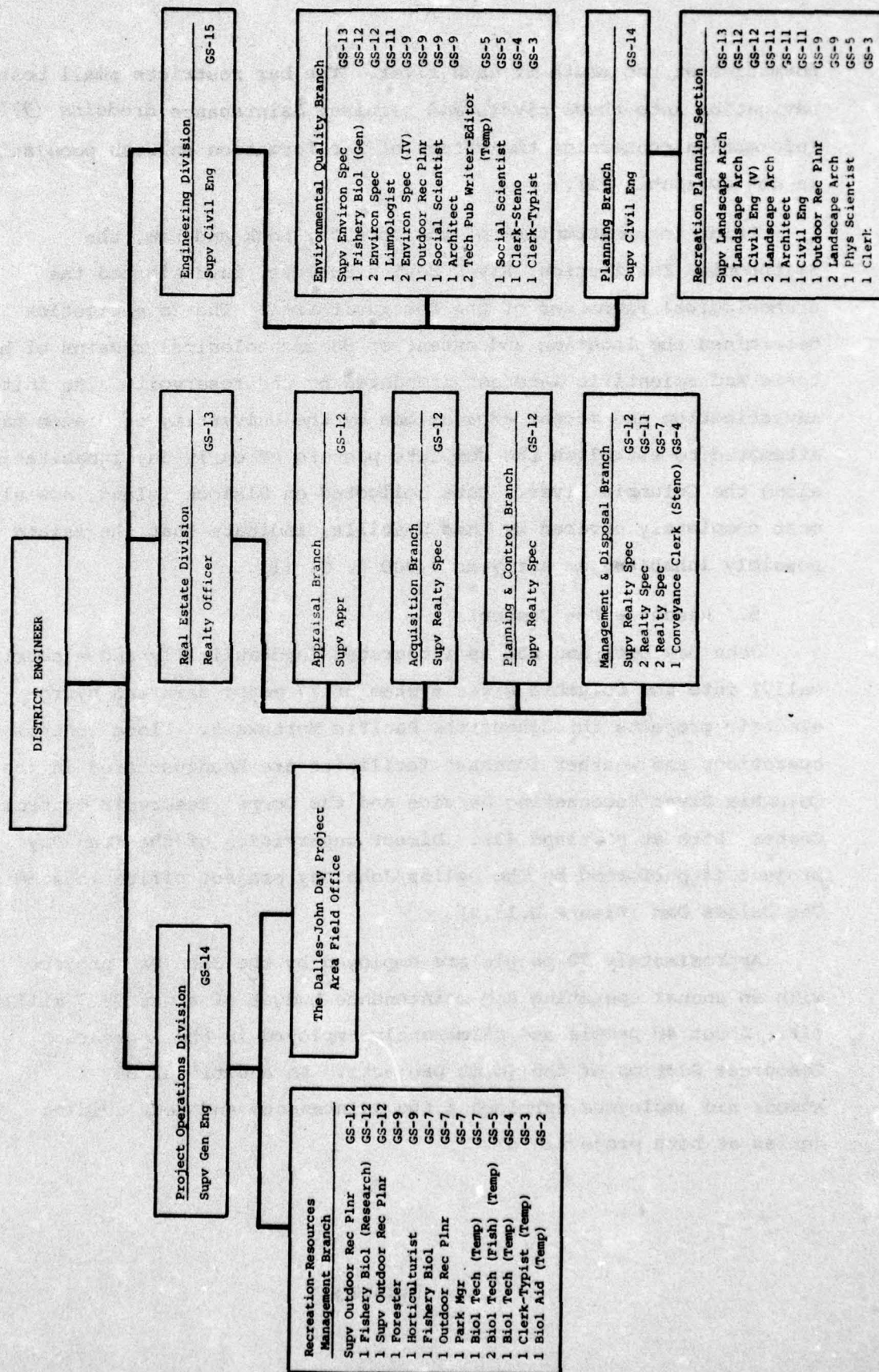
Prior to construction of the John Day Lock and Dam, the Smithsonian Institution, River Basins Surveys, investigated the archeological resources of the reservoir area. The investigation determined the location and extent of 88 archeological remains of historic and scientific interest inundated by the reservoir. The initial investigation and recent excavations by the University of Oregon have attempted to establish the complete pattern of early-day inhabitation along the Columbia River. Data collected on Blalock Island, now almost completely covered by Lake Umatilla, indicate that the island was possibly inhabited as early as 3,000 B. C. (1).

5. Resource Use Controls

John Day Lock and Dam is integrated (hydraulically and electrically) into the Columbia River system of 77 major dams and hydroelectric projects throughout the Pacific Northwest. Flood control operations and weather forecast facilities are headquartered in the Columbia River Forecasting Service and the Corps' Reservoir Control Center, both at Portland (3). Direct supervision of the John Day project is performed by The Dalles/John Day project office located at The Dalles Dam (Figure D.13.2).

Approximately 70 people are employed by the John Day project with an annual operating and maintenance budget of about \$2.5 million (1). About 40 people are permanently employed in the Recreation Resources Section of the joint projects. An additional 65 summer aid employees supplement the maintenance and tour guiding duties at both projects (8).

Figure D.13.2. Recreation-Resource Management Interrelationships - Portland Engineer District.



The Dalles/John Day project engineer reports directly to the Project Operations Division of the Portland District. As Chief of the Recreation-Resources Section of The Dalles/John Day projects, the park manager reports directly to the project engineer and operates independently of the Portland District Recreation-Resources Management Branch (8).

III. KEY FINDINGS

A. Recreation

1. Planning for all 21 public use and access areas around the John Day recreation pool is directly related to the location of towns and communities along the shoreline and access to the recreation pool. During the planning phases of the project, local town and community groups were contacted by the Corps to demonstrate the need for recreation areas. As mitigation for the loss of river access and the necessity for town and community relocation, whether whole or partial, the Corps and respective local groups decided upon Corps planned and developed recreation areas which would be operated and maintained by the local town or community upon completion.

2. Several of the local governments could not meet the cost of operation and maintenance even after initial development. Therefore the Corps was obliged to assume responsibility at all but two public use and access areas for fire prevention and protection of the federal investment.

3. Irrigon Park is operated and maintained by the Irrigon Community Park and Recreation Maintenance District, and Wanahla Marine Park is operated and maintained by the Umatilla County. Two additional public use and access areas await completion of initial development by the Corps before local governments start operation and maintenance under terms of executed leases.

4. Access to all 21 recreation areas, except one, is direct from major highways running parallel to the project shoreline. The remaining one is accessible only by boat but provides excellent recreational opportunities.

5. The facilities at public use and access areas were in excellent condition and the grounds at these areas were clean and well landscaped.

6. The Corps estimates visitation for the 100th year of the project (2071) will be 2.9 million; 1973 visitation was reported as 1,140,500. The facilities available are adequate for the visitor demand.

B. Fish and Wildlife

1. The John Day Lock and Dam is one of four locks and dams on the mainstream Columbia River which, taken together, have severely decreased anadromous fish migrations. The impoundment inundated most salmon spawning and rearing areas. Sport fishing has decreased and commercial fishing has been stopped. Pool level fluctuations were not well scheduled to aid migration or to maintain a constant level during spawning, however, increasing cooperation between the National Marine Fisheries Service, USF&WS, WA Department of Fisheries, Fish Commission of OR, and the Corps have improved timing of pool changes with migration and spawning.

2. Fish kills, due to nitrogen supersaturation and fingerlings passing through the turbines, are problems currently receiving attention. Modification of the spillways and fingerling-bypass system should reduce these problems.

3. As mitigation for lost spawning and rearing areas in the John Day pool, the Corps is financing two existing fish hatcheries. Personnel are stationed at both fish ladders, which were constructed as part of the project, enabling daily estimates of fish movements, populations, and conditions.

4. The Umatilla NWR was established to substitute extensive waterfowl management for loss of nesting islands inundated by the

John Day pool. Although resident geese populations have declined, resident duck populations and migrant waterfowl (including geese) using the refuge have increased due to USF&WS management.

5. Migrant geese, particularly, have increased due to the food available in the grain fields surrounding the region and the protection offered at the NWR where only limited hunting is allowed. This increase is exploited by local grain farmers who charge hunters to hunt on their lands.

C. Corps and Contiguous Land Use

1. Lands acquired for the project are adequate for development of public use and recreation facilities along the shoreline of the recreation pool. Acquisition did not extend up to the canyon rim, however, and as a result some of the lands between the Corps boundary and canyon rim are extensively grazed and badly eroded. Grazing and livestock watering agreements are not controlled by fencing, thus cattle encroachment on the delicate canyon slopes results in severe erosion problems. Continued, these problems will destroy the natural scenic beauty of the area. A more feasible boundary could be established above the canyon rim, which would enable monumentation and fence construction, thus eliminating indiscriminate access and cattle encroachment. Currently, the boundary line falls sometimes on vertical cliffs and 20% slopes.

2. The 1973 RRMS and the 1965 Master Plan provide widely differing figures for the total project area, land area above normal pool, and flowage easements (Table D.13.2).

3. Land use in and around the project benefit directly from the authorized project purposes of navigation, flood control, and power production. Four public-port terminals located contiguous to the recreation pool handle agriculture exportation and petroleum importation

through the region. Electricity produced at the project is used as far away as southern California and directly benefits an aluminum plant operating on 105 acres of leased Corps property.

4. The major collateral benefit provided by the John Day project is the tremendous water supply available to a semi-arid climate. Agricultural interests in the region have increased due to the good production of crops from lands irrigated by reservoir waters.

5. Annually, 100,000 acre-ft of water are withdrawn from the reservoir. The volume removed from the John Day and Umatilla Rivers is so extensive that bar formation is resulting at the mouth of each river due to waters backflowing into each river from the Columbia River.

6. The water supply provided by the reservoir is used to water livestock. Revenue generating agreements and agreements reserved in deed exist for livestock watering rights. Although limited areas of access to the water are prescribed, indiscriminate access has caused rutted cattle paths and overgrazed landscape.

7. Highway and railroad embankments paralleling the lake shoreline, in conjunction with the steep topography of the region, restrict access to the recreation pool.

8. At some areas designated for grazing, access is restricted by contiguous privately owned grain fields without secondary access roads. Therefore, the use of these areas for grazing is restricted to the contiguous land owner.

D. Corps Organization

1. Direct supervision of the John Day Project is performed by the Dalles/John Day Project Office located at the Dalles Dam. Four sections of about 191 permanent and temporary employees are under the supervision of the project engineer. Each section has a chief with

grade ranging from GS-9 to GS-13. The Project Engineer is a grade GS-14.

2. The small staff of the administrative section is housed at the project office. The operations and maintenance sections are mainly concerned with dam and lock operation and maintenance. Separate staffs are stationed at each lock and dam project with about 70 permanent employees at the John Day Lock and Dam.

3. The recreation-resources staff, stationed at both projects, is responsible for operation and maintenance of all Corps land and facilities outside lock and dam operations. Forty full-time and 65 summer aid employees staff the Recreation-Resources Section. Support from the summer aid employees is vital for the success of operation and maintenance of the recreation areas operated by the Corps. Six park rangers (designated park technicians by the district) inspect the recreation areas on the John Day project and all are grade GS-5. Biological expertise to evaluate the carrying capacity of the project lands for wildlife enhancement is lacking at the project level.

4. Budgeting for recreation resources at the project is not allotted separately, but comes from general operations funds. Although the ceiling on the general operations budget has not increased since 1968, the condition and attractiveness of all facilities open to the public were excellent, mainly due to the resourcefulness of the project engineer. The project engineer was very receptive to investigations into his operations whether in a problem area or not. He was up to date on the workings in and around the joint projects and was particularly interested in adding his personal touch to the appearance of Corps facilities. As the main liaison between the Corps and the public, the project engineer makes decisions relative to the joint projects without constant guidance from the District.

5. Information at the District concerning The Dalles/John Day Project is separated in the Engineering, Project Operations, and Real Estate Divisions. The organization within each is good and information is easily obtained. The District technical staff is divorced from the daily operations at the project, but rely upon field personnel for decisions and recommendations.

6. The Recreation Planning Section, Planning Branch, Engineering Division, is staffed with seven landscape architects, two civil engineers, one architect, one outdoor recreation planner, and one physical scientist. The grades within the section are from GS-5 to GS-13, with the outdoor recreation planner a GS-9.

F. Environmental Problems

1. The reservoir and landscape behind John Day Lock and Dam provide majestic scenery, although the main environmental problem associated with the region around the project is soil erosion and related conditions. The new pool level with resulting wave and wind action causes much shoreline erosion and landslides. When hillside fires eliminate the sparse cover of grasses and sages from the surrounding bluffs and canyons, many years are required for re-establishment of the protective vegetative cover. Periods of severe turbidity result when rains wash these burnt hillsides.

2. Associated with erosion is the problem of floating sticks and logs washed into the recreation pool from tributary streams. Hundreds of tons of debris must be removed seasonally to keep the lock and dam free. Also, removal of this debris from the recreation beaches is necessary as a result of deposits left by changing pool elevations.

3. Pollutants from the aluminum production plant located on Corps property contaminate the air and water of the region. Hydrogen

fluoride in the air causes damage to plant life, particularly orchard crops and livestock grasses. Heated waste water discharges into the reservoir include suspended and dissolved solids which have an unknown effect on fish and aquatic vegetation.

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